



**urban
agriculture**
AUSTRALIA



Why do healthy people depend on healthy food from healthy soils?

Since life began on earth, the microbes in soil have played an essential role in selectively taking up nutrients and selectively excluding toxins from the external environment of plants. These processes govern the nutrient composition of plants and animals – our food – on which our health depends.

Back to the beginning

The story of life on Earth begins more than 4 billion years ago, when an earlier sun exploded into a hydrogen cloud. This gave rise to our sun and stardust that in turn coalesced into planets and our solar system.

This stardust consisted of 96 natural elements. Of these, 30 were critical in the evolution of the first living cell 3.8 billion years ago. These are the essential elements that underpin all biochemistry and life. While carbon, hydrogen, oxygen and nitrogen are the building blocks of biochemistry, these 30 mineral nutrients govern the activity of key enzymes and biochemical processes essential to the health of all organisms.

The importance of soil microbes

While carbon, hydrogen, oxygen and nitrogen are available from the atmosphere, mineral nutrients can only be obtained from rocks or the soils derived from them.

Within soils they are mostly unavailable to plants. However, soil microbes that form symbioses with plants dissolve the minerals and make them available to sustain plant growth.

Microbial symbioses provide 2 essential services for plants and the animals who eat them:

1. They selectively take up the correct amounts and ratios of mineral nutrients that plants - and animals – need.
2. They selectively prevent the uptake of toxic elements from the soil solution.

The evolution and development of all cells, organisms and biosystems has depended for 3.8 billion years on these services.

In effect, the nutrient composition of most plants and animals – our food and our health – has been governed by the ability of symbioses, mostly by mycorrhizal fungi, to selectively concentrate and exclude nutrients from an inert often toxic external environment.

Industrial agriculture

Up to World War 2, the health and nutrient value of most of our agricultural plants and animals depended on the microbial uptake processes described above. After World War 2, inputs of chemical fertilizers and pesticides increased to enhance the yields and profits from industrial crops.

These high levels of fertilizers and pesticides killed the mycorrhizal symbionts that had previously sustained the natural solubilization, uptake and cycling of essential nutrients.

Consequently, most plants grown under industrial agriculture now take up their nutrients hydroponically. That is, nutrients are taken in directly via the plant's transpiration flux, in whatever concentrations and ratios are present in the soil solution.

As a result:

- Plants contain very high levels of the nutrients added as fertilizer (nitrogen, phosphorus and potassium), but little or none of the other 27 essential and trace elements that are not soluble and were previously made available by the microbial symbionts.
- Plants often contain high concentrations of toxic elements because the protective microbial membranes are no longer there to selectively exclude them.

If industrially grown plants have different nutrient concentrations, ranges, forms and ratios from the ones we grew prior to World War 2, the animals eating those plants will also have a fundamentally altered nutrition.

The current crisis

Analyses confirm that much of our industrial food now has a third of the nutrient concentration of equivalent foods prior to World War 2, both at the ingredient level and after processing. Much of our food now has major deficiencies in key nutrients and essential trace elements.

Concentrations of toxic elements and chemical residues are far higher.

This fundamental change in the nutritional integrity of our industrial food may have profound but not fully understood implications for our biochemistry and our health. Contrary to industry claims, the issue is not whether a plant can discriminate between a nutrient from fertilizer or naturally from soil – from 'a bag or a bug' - but whether the radically different concentrations, forms and ratios of nutrients and toxins now present in much of our food represent a risk to our health.

In parallel with our adoption of industrial foods and diets, there have been marked increases in a number of diseases. There is evidence of a direct link between diet and many of these conditions, including cancer, diabetes, heart disease, chronic fatigue, and auto-immune and mental illnesses. The increasing burden of these diseases and the inability of our ever more costly health care systems to respond to them signals an urgent need to fundamentally change our approach to preventative health.

How urban agriculture can help

A key action to reverse our current health crisis is restoring the integrity of our food. Recognizing that healthy people need healthy food from healthy soils opens a simple, natural route to this outcome. Healthy soils grow food with the aid of the natural microbial processes that ensure correct uptake of nutrients and exclusion of toxins. Urban agriculture provides the practical means by which much of the community can ensure they are once again eating healthy food from healthy soil.

For further information on this topic

The Mulloon Institute

www.themullooninstitute.org

Soils for Life

www.soilsforlife.org.au

Nutrition Rules, Guidelines from the Master Consultants Volume 1: Soil Health-Animal Health-Human Health, by Graeme Sait (Soil Therapy Pty Ltd, 2003)