

FDI Feature Interview

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Dr Maarten Stapper: The Link Between Healthy Food and Biological Farming – Part One

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Key Points

- There is an increasing body of scientific research that supports the concept of a relationship between healthy food and biological farming.
- Biological farming sits between opposite approaches to agriculture; industrial farming and organic farming and takes best practice from both areas to achieve healthy soils and biodiverse landscapes.
- In healthy soils, plants have a symbiotic relationship with soil microbes.
- Plants cannot get the minerals to make nutritious food, nor chemical compounds for protection against adverse environmental conditions and attacks by insects and diseases, without active soil microbes.
- Microbes are the link between healthy soils and healthy people, as both humans and soils depend on them to maintain their health.
- Biological farming greatly increases soil carbon and decreases greenhouse gas emissions and thus is mitigating climate change.

Introduction

The concept that human health is linked to nutritious food is gaining increased attention.

This comes at a time when 25 per cent of the world's arable land is degraded, with a continuing annual loss of one per cent. At the same time, water resources are declining, global warming is influencing production and demand continues to increase due to an expanding population.

Dr Maarten Stapper is internationally acclaimed for his work on the relationship between healthy food and biological farming. He believes that the natural, self-organising ecosystem, with healthy soils that have provided food for millennia, is increasingly being disrupted by industrial farming practices and changing climates. In his words, the Green Revolution seems to have reached its limits, with yields plateauing and the

widespread use of synthetic inputs contributing to land degradation, water pollution and biodiversity loss. At the same time, chronic diseases are escalating and are increasingly being associated with industrially produced food across the world.

He further observes that high-input agriculture, including genetic modification (GM), produces 30 per cent of global food and fibre, using 70 per cent of agricultural industrial resources. He then poses the question: can we really feed the world with this industrial approach and still have a healthy population and limit global warming?

The UN Food and Agricultural Organization promotes an alternative approach and encourages a debate on the potential of agroecology. The outcome of an agroecological approach would be the regeneration of degraded soils and landscapes to produce healthy food, while using the increasingly scarce resources of fresh water, arable soil and energy more efficiently.

Interview

FDI – What do we mean by agroecological and biological farming?

Dr Maarten Stapper – Biological farming, which is part of agroecological farming, is a new way of achieving productive, profitable and resilient farming. It sits between the two polarising opposites of industrial and organic farming. It takes the best practices from both and can maximise the efficiency of water and nutrient usage. It minimises the use of synthetic fertilisers and herbicides, with no fungicides and insecticides required. It regenerates soils, while activating soil biology and increasing soil carbon. Such healthy soils have their physical, chemical and biological components functioning and in balance, providing natural soil fertility. Healthy soils are the foundation for biodiverse landscapes.

The increase in soil carbon with this regenerative farming approach, compared to current farming practices, has been 10 times faster, to more than double the accepted total amount of carbon. Thus, not only has soil fertility increased, but lowering associated atmospheric carbon dioxide and reduced agricultural greenhouse gas emissions help to mitigate climate change.

Many farmers have recognised that high-input farming is the wrong direction and, over several seasons, have profitably changed to using biological inputs and principles. As they still lack detailed knowledge, such a step-by-step change appears easier and more profitable than a direct move to organic farming. Using this process of ecosystem adjustment, soils become biologically active and functioning over a two- to five-year period.

Biological farming is a grassroots movement not yet supported by universities, government agencies or most agribusinesses. Small companies supply biological inputs with advice on their application. Currently, biologicals are two per cent of global agricultural chemical inputs with a 10 to 15 per cent annual growth. There is hardly any written documentation about practices, however, as they change with location and season. Farmers must be innovative, intuitive, persistent and learn with others. Hence the uptake is slow. Major changes are required in the science and management of our food production systems. Agricultural science is slow to follow and labels biological farming as ‘not evidence-based’. Agroecology has emerged as the science covering this holistic approach to farming. At a global scale, UN agencies (FAO, UNCTAD, UNEP, IAASTD) have released reports during the past decade supporting agroecological farming as the way to achieve the UN Sustainable Development Goals and feed the world, without a need for genetic modification. The big multinational companies in crop protection chemicals have recently started with biologicals, confirming the market potential of biological farming.

FDI – What is the difference between healthy soils and sick soils?

Dr Maarten Stapper – Health and sickness are associated with living. The soil food web is the self-organising community of organisms living in, or with, the soil and interacting with plants, animals and the environment.

In healthy soils, plants have a symbiotic relationship with soil microbes. Soil microbes protect and feed a plant, while the plant feeds them with a carbon source that leaks from the roots. Plants communicate to soil microbes the need for them to solubilise the minerals required to make strong cell walls and chemical compounds, as the plant's protection against attackers. Such chemical compounds have now been identified as antioxidants and are important for the health of humans and grazing animals. All terrestrial life is thus dependent on healthy soils for health and wellbeing; they make up the skin of planet Earth.

Soils get sick and soil problems occur when the ecosystem-functioning of a soil falls below a threshold. With so many factors interacting, it takes a long time to restore thresholds in broken ecosystems. Sick soils have evolved from healthy soils in two ways. Recent high-input, mechanised industrial farming, and over-cropping and over-grazing throughout history, have caused soil carbon loss and soil food web collapse.

Sick, unbalanced soils have problems that are symptoms of the management that disrupts soil food webs. Symptoms include compaction, soil crusting, acidity, salinity and soil borne diseases. They are the result of gross oversimplification of fertilisation and plant protection practices that use harsh synthetics and ignore the delicate balance of microbiota, trace minerals, nutrients and carbon in the soil. There is increasing awareness, however, that the synthetics used compromise the environment, food quality and human health.

FDI – Do current farming practices lead to unhealthy food and why has this happened?

Dr Maarten Stapper – Unhealthy foods have poor nutrition and may have chemical residues. Unhealthy foods can originate from current farming practices because of the following:

- Foods from plants that grow on sick soils have much lower nutrient (e.g. minerals, vitamins, proteins) and [phytonutrient](#) (e.g. antioxidants) content, as soil microbes are not there to solubilise the building blocks needed that are in the soil but are not available to plants.
- Plants have been bred for high yields, without measuring mineral content as a selection criterion. Freely available minerals that are supplied as fertilisers to produce high yields (NPK for instance) maximise dry-matter production, but the mineral content of the plant remains low. This has been explained as being unavoidable because of dilution caused by high yields. However, the required minerals are present in the soil but unavailable because of poor microbial activity caused by recurrent use of synthetic inputs.
- Fresh foods produced under high-input systems have a much higher water content, associated with the uptake of freely available nitrogen, which is another dilution factor.
- Plants that grow on sick soils need synthetic fertilisers and chemicals to achieve yields. By regulation a maximum amount of residue is allowed to remain on foods for each chemical. Peer-reviewed science, however, has shown for some chemicals that a regular dose below the allowed maximum can affect human health. Safe chemical use seems not to exist. (https://www.ifoam.bio/sites/default/files/mythsofsafepesticides-summary_web.pdf)

This never ending downward cycle of using pesticides and fertilisers to protect plants and make them stronger and bigger, continues. Without active soil microbiota, however, plants cannot get the minerals to make chemical compounds for protection against attacks by insects and diseases, nor against adverse environmental conditions.

Apparent declines of 30 to 80 per cent in nutrition levels in vegetables, fruits and grains from the US and UK, have been reported over the period since 1945. These statistics are questioned by some leading scientists, as each update comes from different sources and conditions. Metadata analyses of nutrition studies, however, showed a 20 to 50 per cent improvement in, for example, antioxidants for organic produce, generally grown with more microbial activity. For new varieties reductions of 20 to 80 per cent in mineral contents have been found when compared to old varieties in studies with these varieties side-by-side.

FDI – How are healthy people and healthy soils linked?

Dr Maarten Stapper – Microbes are the link, as both humans and soils depend on them to maintain their health. Microbes are the smallest and most prolific organisms on Earth. All species have their own tasks, with health the outcome when they are in balance. The vast majority manage the health of larger organisms both from within and outside. They feed and protect, and they are fed by their hosts. They create healthy environments for hosts to live in and maintain their health.

Pathogens on the other hand, which form less than 10% of microbe species, play another game. They cause disease in their quest for food when they find a hole in the defence systems created and maintained by beneficial microbes in humans, animals and plants. When we kill pathogens in plants, or germs in humans, it weakens defence systems, because beneficial microbiota are also killed in the process. This makes a renewed attack more likely and, consequently, more sickness is the result.

The beneficial microbes in our intestines are made redundant and disappear when we eat mostly processed, refined, sugary, salty foods, such as fast foods. The beneficial microbes on our skin and inside our bodies are killed when we attack germs with bleach and sanitisers, or with antibiotics as medication. A weakening of our immune system is the result, which makes us vulnerable to more diseases. The more you use these bad products, the more immunity you lose. A chronic disease is caused by never-ending inflammation of cells in the weakest part of our body, as a result of chemicals entering the body and being stored there. Chronic inflammation is fuelling epidemic rates of joint problems, arthritis and asthma; it also contributes to dementia, heart disease and cancer.

So, our focus on the land and in our homes has been on the microbes that do harm and how we can eradicate them. Yes, there are many bad bugs that can have serious consequences for our health. What goes largely unnoticed is the critical role that bacteria play in keeping us healthy.

A spoonful of healthy soil can have one billion microbes. We humans harbor over 100 trillion bacteria in and on our body and the majority of these microbes live in our intestines. In fact, the gut is one of the most complex ecosystems on the planet. Look after it and you are guaranteed better health. Harm it, and you risk harming the health of your entire body. The gut affects your health, from your digestion to your weight, mental health, immune system and skin. Healthy food keeps the gut healthy.

Conclusion

In Part Two of this interview Dr Stapper will discuss further the relationship between food quality and the general health and well being of the consumer. He will then examine how production, supply and demand need to be modified to promote a “healthy soil, healthy food, healthy people” society. This paper is scheduled to be published next week.

About the Interviewee: Dr Maarten Stapper is a farming systems agronomist whose main focus is helping farmers improve the profitability of their operations, by harnessing the power of natural healthy soil processes.

Maarten believes that by improving the use of inputs and understanding those practices that negatively impact on soil health, farmers can have a positive impact on their land and production.

Through Maarten's research work, discussions with Landcare groups and with a wide range of farmers, he has come to the belief that science must take a broader view to achieve the sustainable development of agricultural industries. To achieve this, it must look at the whole farming system - where everything is linked to everything else.

Harnessing over 40 years experience as a scientist and farming system's agronomist, Dr Maarten Stapper now works as a private consultant, assisting farmers in the transition from industrial to biological farming systems. Maarten speaks regularly across the continent and provides a range of consulting services to groups and individuals.

Any opinions or views expressed in this paper are those of the individual interviewee, unless stated to be those of Future Directions International. The views of the interviewee are his personal view as author of the book and are not of his current and past employers.

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