Chapter 1

The Global Growth and Evolution of Organic Agriculture

John Paull*
University of Tasmania, Hobart, Tasmania, Australia

Abstract

The *de facto* organic agriculture of millennia was disrupted by the arrival of synthetic fertilisers and pesticides. The industrial-scale chemical explosives and poison gas production of World War 1 was, post war, promptly re-purposed as farm chemicals, synthetic fertilisers and pesticides. In 1924, the New Age philosopher, Dr Rudolf Steiner, called for a differentiated agriculture which eschewed synthetic chemicals, and relied on nature and biology rather than chemistry. By 1938, his Experimental Circle of devotees had tested and evolved his ideas into 'biodynamic farming'. Influenced by Rudolf Steiner's concept that 'the farm is an organism', Lord Northbourne coined the term 'organic farming', and, in 1940, he published 'Look to the Land', a manifesto of organic agriculture. He posited a contest of chemical agriculture versus organic farming, a contest that he foresaw may rage for decades or centuries. In the decades that followed, advocacy groups for biodynamics and organics proliferated. Five such entities (from France, Sweden, United Kingdom, South Africa and USA) came together in 1972 to form the International Federation of Organic Agriculture Movements (IFOAM). Organic agriculture is now practised in 187 countries, accounts for 72.3 million hectares of agriculture land, and is valued at US$123 billion per annum. Organic agriculture production has evolved to presently exclude: (i) synthetic fertilisers; (ii) synthetic pesticides; (iii)

* Corresponding Author's Email: j.paull@utas.edu.au; john.paull@mail.com.

Paull, J. (2023). The Global Growth and Evolution of Organic Agriculture. In J. N. Bhakta & S. Rana (Eds.), Research Advancements in Organic Farming (Ch.1, pp. 1-17). New York: Nova Science Publishers.

antibiotics and synthetic medications; (iv) irradiation; (v) genetically modified organisms (GMOs); and (vi) nanotechnology. Consumers report that they purchase organic food because it is better for them, better for their children, better for the environment, and better for animals. Certification has enabled the wide geographic distribution of organic produce. Organic agriculture is growing at 11.5% per annum, and has been growing at this rate over the past two decades. Organic agriculture is thriving as a niche agriculture, accounting for 1.5% of global agriculture. Can it achieve the vision of the early advocates of organic agriculture to become the mainstream agriculture? The Indian state of Sikkim is now 100% organic. A longitudinal graph of the growth trajectory, and a world map of the distribution of organic agriculture, are presented.

Keywords: organic farming, Fritz Haber, Rudolf Steiner, Koberwitz, Lord Northbourne, world map, synthetic fertilisers, synthetic pesticides, irradiation, genetically modified organisms, nanotechnology, consumers

Introduction

The proposition of organic agriculture is that food can be, and, indeed, ought to be, produced without poisoning the food, the farm, the farmer, and the consumer. It is the proposition to keep the food chain clean and healthful, free of synthetic toxic substances, from one end to the other. This straightforward proposition is at loggerheads with what is now a multibillion-dollar agro-chemical industry (with leaders including Syngenta, Bayer, BASF, and Monsanto).

Organic agriculture is now an enterprise practiced in most countries of the globe. As a movement, it began about a century ago with a series of eight lectures by the Austrian New Age philosopher, Dr Rudolf Steiner, in an obscure village in eastern Germany, now Poland (viz. Koberwitz, now Kobierzyce).

This chapter traces the birth, evolution, and growth of organic agriculture, the geographic distribution, the differentiation, by means of certification, of organic produce from the output of chemical agriculture, and some considerations for the future.

The Birth of Organics

From the outset, 'organic agriculture' was a contrarian idea. In the summer of 1924 the New Age philosopher, Dr. Rudolf Steiner (1861-1925), was on a mission to push back against the post-World War 1 rise of chemical agriculture. For the previous forty centuries, by one account, agriculture had been reliant on natural and biological processes, rather than on synthetic industrial chemicals (King, 1911; Paull, 2011a). In the aftermath of WW1, this reliance changed, as war chemicals were promptly re-purposed and marketed as farm chemicals, in particular as synthetic fertilisers and synthetic biocides.

The brilliant German Jewish chemist, Fritz Haber (1868-1934), had demonstrated, in 1909, a method for 'fixing' atmospheric nitrogen. His process captured the abundant nitrogen gas (N_2) from the air by reacting it with hydrogen to produce ammonia (NH_3) (Haber, 1920). The Haber-Bosch industrial process is still used today. What was exciting to some at the time was that the Haber-Bosch process enabled the production of cheap and abundant nitrogenous explosives. This ushered in the catastrophe of the world's first industrial-scale human slaughter, characterized as 'The Great War' at the time. A gruesome death was the fate of ten million young men in the prime of life who would never grow old.

Dr Fritz Haber also oversaw Germany's WW1 chemical warfare production, and introduced poison gases as new lethal weapons, asphyxiating many, disabling and blinding many others (Charles, 2005). Fritz Haber was awarded the Nobel Prize for chemistry in 1918 (Haber, 1920). It was a controversial choice at the time. It was not one of the Nobel Committee's finest decisions to award this 'father' of chemical warfare and 'father' of chemical agriculture their prestigious award, even in the shadow of the catastrophe of WW1. Despite his loyal service to the German war machine of WW1, the rise of the Nazis in Germany precipitated the fall of Fritz Haber (due to his Jewish heritage). He did not live to witness his toxic legacy of poison gases used in the gas chambers of Auschwitz and other concentration camps. In the immediate post-WW1 period, and basking in the acclaim of the Nobel Prize, Fritz Haber could never have imagined the massive fall from grace that the near future held in store for him.

In the chaos of post-war Germany, there was disquiet amongst some farmers over the intrusion of agricultural chemicals into their domain. A farming estate manager, Carl von Keyserlingk (1869-1928), invited Rudolf Steiner to present a course to reveal what Anthroposophy had to say about farming. Anthroposophy was Rudolf Steiner's 'spiritual science',

headquartered at Dornach, Switzerland. In the summer of 1924, Rudolf Steiner delivered the 'Agriculture Course' at the estate of Carl von Keyserlingk to a group of farmers and others at Koberwitz, Germany (now, and since 1945, Kobierzyce, Poland,) (Steiner, 1924b; Paull, 2020).

A core proposition of Rudolf Steiner was that 'the farm is an organism'. It was a framing mechanism. For Rudolf Steiner, the farm is not a factory, not an economic unit of production. His Agriculture Course ran over ten days, during which time Steiner delivered what he termed "hints" for achieving an agriculture differentiated from the prevailing thrust of chemical agriculture (Steiner, 1924b). His agriculture was to be focused rather on biology and nature (Steiner, 1924a). Rudolf Steiner suggested various natural preparations that could be tested to determine their efficacy (Steiner, 1924a; Pfeiffer, 1938a). Over the next decade and a half, Rudolf Steiner's agricultural 'hints' were tested, and evolved as 'biodynamic' agriculture. Biodynamics went public with the 1938 publication by Ehrenfried Pfeiffer of his book 'Bio-Dynamic Farming and Gardening' (Pfeiffer, 1938a; Paull, 2011a).

Sixteen years after Koberwitz, a biodynamic farmer in Kent, England, Lord Northbourne (1896-1982), mentored by Ehrenfried Pfeiffer, coined the term 'organic farming'. It was a logical semantic extrapolation of Rudolf Steiner's characterisation of 'the farm is an organism'. Lord Northbourne published his manifesto of organic agriculture 'Look to the Land' in 1940 (Northbourne, 1940). Lord Northbourne pitched a contest of 'chemical farming versus organic farming' (Paull, 2014; Paull, 2021).

The Evolution of Organics

Organic farming began life as farming without synthetics, without synthetic fertilisers and pesticides. That has remained the essence of organic farming; farming using nature and biology, rather than fighting nature and biology with chemicals. However, as chemical agriculture has evolved, so organic agriculture has also evolved.

Rudolf Steiner had the prescience at Koberwitz to recognise three important propositions if his vision for a differentiated agriculture was to be realised. Firstly, that ideas should be rigorously tested for efficacy. Secondly, that ideas evolve (perhaps even at this seminal stage, he realised he would not be around to guide that process; he died nine months after the Course). And thirdly, that a dedicated and committed set of researchers could test and guide this fresh agricultural impulse.

At the Course, Rudolf Steiner founded the Experimental Circle of Anthroposophic Farmers and Gardeners. Of more than one hundred attendees, sixty Course attendees joined the Experimental Circle. It was the first organics research consortium.

By the outbreak of WWII, the Experimental Circle had grown to about 800 members. They were distributed around the world, through Europe, Britain, USA, Australia, South Africa and Asia. The work was overseen by Ehrenfried Pfeiffer (1879-1961) who was based at the Natural Science Section of the Goetheanum (Anthroposophy headquarters), at Dornach (near Basel), Switzerland. Under his tutelage, this differentiated agriculture was named 'biodynamic' agriculture. Ehrenfried Pfeiffer's 1938 book 'Bio-Dynamic Farming and Gardening' finally put these ideas into the public domain.

The Betteshanger Conference on Bio-Dynamic Farming was hosted by Lord Northbourne, in Kent, England, in July 1939. It was led by Ehrenfried Pfeiffer (Northbourne, 1939; Paull, 2011b & c). A few months later, the world was again at war. In many quarters, the appetite for Germanic ideas was thereby extinguished. In May 1940, Lord Northbourne's book 'Look to the Land' appeared. He coined the term 'organic farming'. His book stripped out the prolixity, abstruseness, esotericism and mysticism of Rudolf Steiner, and, with compelling clarity, Lord Northbourne presented a manifesto of organic agriculture. From this point on, biodynamics and organics have developed in parallel, with the general recognition of biodynamics as a particular manifestation of organic agriculture.

In USA, Jerome Rodale took up Northbourne's terminology and ideas. He published the first issue of his periodical 'Organic Farming and Gardening' in 1942 (Rodale, 1942). He promptly interchanged this to 'Organic Gardening and Farming' as he realised that there were far more gardeners than farmers, and gardeners were more inclined to purchase his periodicals (Gross, 2008). At its peak the Rodale's enterprise was reportedly reaching 45 million readers and distributing to 50 countries. In various iterations, the Rodale organics periodical was published in hardcopy until 2015.

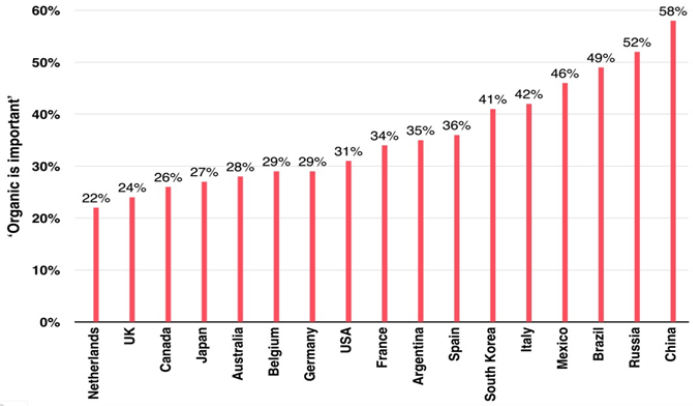
In 1944, in Australia, Northbourne's ideas spawned the first association to proselytise for the uptake of organic farming. The Australian Organic Farming and Gardening Society (AOFGS) was followed by the founding of the Soil Association in 1946 in Britain - missing the term 'organic' but, nevertheless, sympatico. The following decades witnessed a global proliferation of societies of advocates and enthusiasts for biodynamics or organics.

The post WWII period saw the fruits of chemical warfare programs of WWII migrate to chemical corporations, including Monsanto and Bayer, and the marketing push to farmers and gardeners proceeded apace. The gardening books of the immediate post war period recommended DDT for the home gardener (e.g., Hurley, 1949).

As chemical and other technologies evolved and intruded into the agricultural domain, the practice of organic (and biodynamic) agriculture likewise evolved.

Table 1. The six exclusions for organic agriculture production

Six exclusions for organic agriculture
Synthetic fertilisers
Synthetic pesticides
Synthetic medications
Genetically modified organisms (GMOs)
Radiation
Nanotechnology



Data source: GfK, 2017.

Figure 1. Percentage of consumers (n=23,000) who rate "organic' as important in making their food choices.

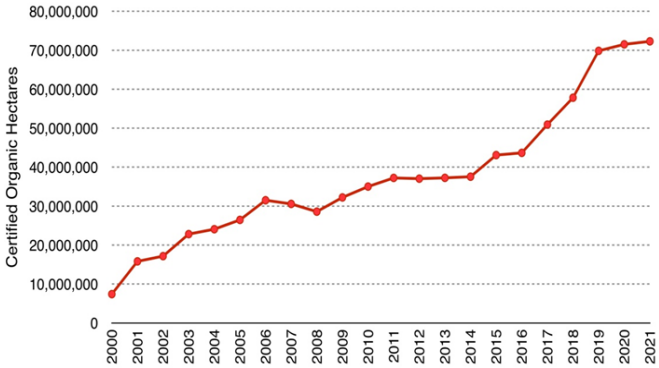
Organic food began life as food produced without synthetic fertilisers and pesticides. Now, there are six exclusions of organic farming: (i) synthetic fertilisers; (ii) synthetic pesticides; (iii) antibiotics and synthetic medications; (iv) irradiation; (v) genetically modified organisms (GMOs); and (vi) nanotechnology (Paull and Lyons, 2008) (Table 1).

As technologies continue to intrude into agricultural practices and the food chain, it can be anticipated that further exclusions to ensure organic food is food, 'pure and simple', is what consumer's would regard as 'natural', and is food without the incursion of techno-pollutants and contaminants.

Organic is now an important aspect of consumer food choices (Figure 1). Most (72%) consumers report purchasing organic food 'regularly' or 'sometimes' according to a study of 21,261 consumers in 38 countries (Nielson, 2005).

The Growth of Organics

Organic agriculture is presently practiced in and reported from 187 countries. It accounts for 72.3 million hectares of certified organic agriculture production. There is a further 35.1 million hectares of organic wild culture hectares. Organics production is valued at US$123 billion per annum. There are a reported 3.1 million organics producers (Willer et al., 2021). Certified organic agriculture accounts for 1.5% of global agriculture hectares. Biodynamic agriculture is practiced in and reported from 55 countries and accounts for 252,000 hectares, which is about 0.35% of the total organic agriculture (Paull and Hennig, 2020).

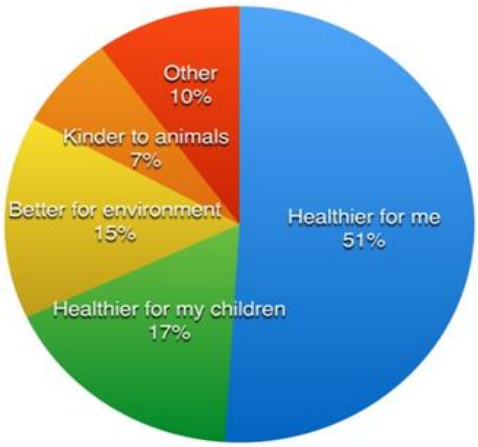


Data sources: annual reports from Willer and Yuseffi, 2000 through Willer et al., 2021.

Figure 2. Global certified organic hectares, 2000 to the present (year reported).

Global statistics of organic agriculture have been reported each year beginning in 2000 (Willer and Yussefi, 2000). In the two decades of reported statistics, certified organic agriculture hectares has grown from 7,407,679

hectares across 62 countries to 72,285,656 million hectares in 187 countries (Willer et al., 2021). The organics sector has exhibited annual compounding growth of 11.5% per annum for the past 21 years (Figure 2).



Data source: Nielsen, 2005.

Figure 3. Consumers (n=21,261) purchase organics for reasons of health, environment and animal welfare.

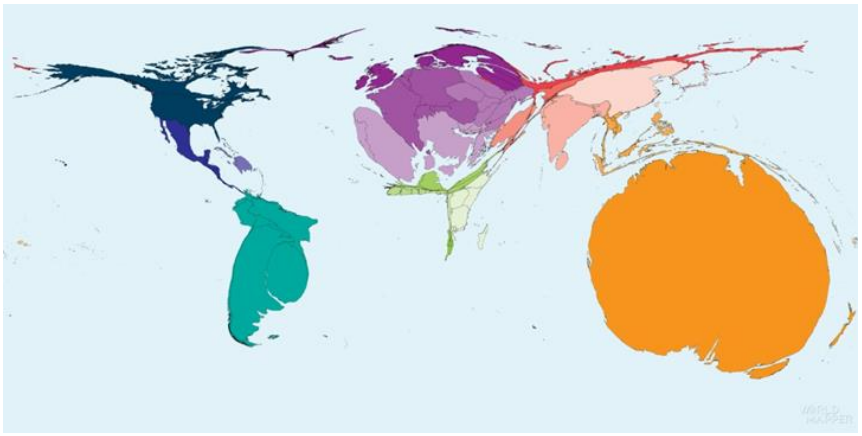
The growth of organics is driven by the two end points of the food chain, consumers and farmers, as well as by retailers, distributors and food manufacturers. Consumers provide the crucial pull factor. It is consumer demands which others in the food chain endeavour to satisfy.

Consumers choose organic for reasons of health, environment, and animal welfare (Figure 3). Farmers receive a premium price for organic produce. This offers an incentive and a reward for organic practices. Meanwhile, organic practices safeguard the health of the farmers themselves, their family, and their workers. As stewards of their land, farmers can witness the environmental benefits of organics, accruing to their soil, soil organisms, animals, and wildlife. Organic practices facilitate soil health and carbon sequestration, and will in some jurisdictions attract financial incentives.

The Geography of Organics

Organic agriculture is a worldwide phenomenon, however the uptake is uneven (Figure 4). Australia (with 35.7 million hectares) leads the world,

accounting for about 50% of global organic agriculture hectares. Australia is followed by Argentina (3.7 m ha), Spain (2.4 m ha), USA (2.3 m ha), India (2.3 m ha), France (2.2 m ha), and China (2.2 m ha).



Source: Paull and Hennig, 2019.

Figure 4. World map of organic agriculture: a cartogram with countries sized according to their reported certified organic hectares.

Internationalism

Clusters of organics advocates proliferated around the world in the wake of Rudolf Steiner's 1924 Koberwitz course and Lord Northbourne's 1940 book 'Look to the Land'. The internationally best selling 1962 book of Rachel Carson (1907-1964) 'Silent Spring' (Carson, 1962) gave a fillip to groups, and societies of organic and biodynamic advocates and enthusiasts. The book was cryptically informed by two New York biodynamic farmers, Marjorie Spock and Mary Richards, but this was not revealed in Carson's book (Paull, 2013).

The multiplicity of societies was generally 'doing their own thing', exercising their own advocacy, setting their own agenda, and promoting their own visions. There were knowledge interchanges via lecture tours (Balfour, 1959; Paull, 2011d; Paull, 2020) and the distribution and exchange of periodicals, including of the US Rodale 'Organic Gardening and Farming', the UK Soil Association's 'Mother Earth', and the Australian Organic Farming and Gardening Society's 'Organic Farming Digest' (Rodale, 1942; Paull, 2011e; Paull, 2008).

In 1972 the President of France's Nature et Progrès, Roland Chevriot, proposed an international umbrella organisation to unite the diversity of organics groups around the world (Chevriot, 1972). At Versailles, near Paris, the 'International Federation of Organic Agriculture Movements' (IFOAM) was founded by five organics advocacy organisations. They were a diverse group, geographically diverse and philosophically diverse: France's Nature et Progrès; the UK's Soil Association; The Soil Association of South Africa; the Swedish Biodynamic Association; and Rodale Press from USA.

Curiously, none of the five founding members bore the term 'organic' in their name, yet the name IFOAM acknowledged that 'organic' was their common purpose and despite the French origination of IFOAM, the name was settled in English (Paull, 2010a).

The founding of IFOAM was a coming-of-age moment for Organics. At this point there were no statistics of uptake. Disparate groups now had a formal method of cooperation, of idea and knowledge sharing, and of development.

Roland Chevriot's creation of IFOAM met a need and the membership grew quickly. The existence of IFOAM lent international credibility to Organics. IFOAM convened conferences to share knowledge. Eventually it assembled statistics of the sector, now collated annually (Willer et al., 2021). IFOAM's triennial Organic World Congress (OWC) is now the leading global organics conference. The OWC 2017 was held in India and attracted 2479 delegates from 90 countries (OFAI, 2018). The OWC 2024 is to be held in Tunis (Al-Medina), Tunisia.

IFOAM now claims "800+" affiliates, from "100+" countries and six continents (IFOAM, 2020). The name has recently morphed into the rather ponderous 'IFOAM - Organics International'.

Certification of Organics

Certification of organic production provides assurance for consumers and recognition for farmers. It enables the decoupling of a relationship between producers and consumers, as it preserves the organic identity and the portability of this differentiated produce across time and space. Certification paves the way for lengthening the supply chain. It facilitates the provision of organic produce to geographically distant consumers, not just within country borders and it also facilitates international exports.

Organic certification is a mechanism for monetizing organic production by enabling product differentiation in the marketplace. Certification preserves

a price premium along the supply chain by preserving the organic identity of the product. Price premiums for organics most typically vary between 0% to 100%. Premiums vary by season, availability, outlet, and geography. One study reported certified organic premiums (over and above the price of non-organic certified produce) ranging from 15% (bananas) to 139% (carrots) (PANUK, 2017).

Along with certification came logos and standards, the development of export opportunities and, in time, the mutual recognition of national certifications and standards, and eventually statistics and quantification of the organics phenomenon.

While organic standards are specific to certifiers, and certifiers are typically local or national, there is general harmony and congruence across the multiplicity of individual standards regarding the six exclusions (Table 1).

A downside of organic certification is that it is a binary classification - 'certified organic 'versus 'the rest'. In contrast, organic production can be considered a spectrum of practice. This is a view that is heresy to organic certifiers who have a vested interest in a binary view which protects their 'patch'. The net effect is that the statistics of organic production are under-reported because uncertified organic producers are excluded from the count, and treated as though they are practicing chemical agriculture.

There are a multitude of reasons why organic producers are not certified. First, there is the cost. There is the bother and intrusion of third parties. There is the question of availability of a local certifier and whether a local premium for organic certification is available, and if the integrity of the organic certification can be sustained in the market place. Certification favours large producers who distribute products widely. Organic certification disfavours small producers with short supply chains who supply local consumers and markets, who may not be able to secure a price premium locally, and as small producers the cost will be a disincentive at the very least, and may be prohibitive.

The certification of organic is a certification of the process of production, not a certification of the product (it certifies that this product I the outcome of a process). This means that the task of the certifier is to certify that the production process excludes the six exclusions (synthetic fertilisers, pesticides, GMOs et al., see Table 1) Except in exceptional circumstances the organic produce *per se* is not tested for residues. However, where such tests are conducted, the residuals are much lower or absent in organic products compared to non-organic products and dietary conversion to organic food reduces the pesticide load of consumers (Hyland et al., 2019).

Future Organics

The premise that we cannot poison our way to health, wellbeing, and prosperity has retained its salience across the decades. The pioneers of organics did not envision organic agriculture as a niche agriculture, although that is exactly what it is at present. Certified organic agriculture hectares account for 1.5% of global agriculture hectares (Willer et al., 2021).

Rudolf Steiner stated that his agricultural impulses were for all farmers (Pfeiffer, 1958). Lord Northbourne (1896-1982) foresaw a contest of chemical agriculture versus organic agriculture. In his view, it was a battle that would be waged for decades, and "perhaps for centuries" (Northbourne, 1940).

Is organic agriculture a success? After almost a century of advocacy and practice of organics, organic agriculture is reported in 187 countries and has grown at 11.5% per year, a good pace, year on year, for the past two decades. That is success. But, at the same time, certified organic agriculture only accounts for 1.5% of global agriculture (Willer et al., 2021). An envisioned Otopia of 100% organics remains a distant goal (Paull, 2010b).

The demonstrable successes of organics are moderated by the reality that organic agriculture is a niche agriculture. Arguably, it is thriving as a niche, but niche products and practices carry with them the risk of being extinguished, and the prospect of organic agriculture stepping up to become the mainstream agriculture remains elusive.

There are many exemplars of organics success and leadership (Paull, 2016). Australia accounts for half of the world's certified organic agricultural (Paull, 2019). Liechtenstein's agriculture has achieved 41% organic, and Austria has achieved 26% organic (Willer et al., 2021). The Indian state of Sikkim has achieved 100% organic agriculture (Chief Minister's Office: Sikkim, 2016; Paull, 2017). Multiple other Indian states have goals to emulate Sikkim's success, but none are yet to achieve it. Bhutan has announced the bold aspiration to be the first 100% organic country, but actions matching the aspiration are yet to materialise (MoAF, 2017). Russia has plans to be an organic food export powerhouse for Europe (Putin, 2017). The indications are promising, yet there is a load of work and enduring commitment to convert aspiration to achievement. As in other human endeavours, 'when all is said and done, more is said than done'.

Social licence is with organic agriculture. There are no consumers clamouring for pesticided food. There are no queues of mothers demanding more chemical residues in baby food. No restaurant patrons seeking menu items that have been herbicided, fungicided, insecticided, rodenticided,

miticided, aracnicided and, altogether thoroughly pesticided. There are no such consumers, mothers, nor restaurant patrons.

It would be a game-changer if the pesticides omertà was extinguished and food labels needed to declare the pesticides used in production and the pesticide residues embedded in the product. USDA tests on non-organic strawberries in USA reported that 99% of samples had detectable residues of at least one pesticide, there were on average eight pesticides present per sample, and 30% had residues of 10 or more pesticides (EWG, 2021).

The battle of organic versus chemical agriculture is an asymmetric battle. Money, corporate power, corporate corruption, marketing and agricultural extension services and the promises of 'magic bullet solutions' are in the hands of giant multinationals. Universities are part of the problem. Imagine the prospects of a grant application for some genetically modified wonder organism, or some nanotechnology wonder chemical, the prospect of lucrative patents for the researchers and/or the university, and the prospect of lucrative strategic partnerships with Big Cash Corp, versus a grant application for more careful stewardship of nature and biology (with no prospects of patents or lucrative partnerships).

The products of chemical agriculture are generally cheaper than the products of organic agriculture. For chemical agriculture, there is less oversight, there is no labelling requirements to declare the smorgasbord of toxic chemicals applied to the product, the land or the environment. The damages inflicted on the land, the environment, the plants and animals of the farm and environs, the adverse health outcomes for farm workers and neighbours, and the health implications of the pesticide load for consumers, are all externalities. They are not quantified, they are ignored as though they do not exist, and they are not costed into the price of the product.

These harms of chemical agriculture are externalities - they are a 'free kick' for the pesticide industry, their shareholders and customers. This phenomenon is an instance of 'The tragedy of the commons' (Hardin, 1968). The result is that pesticided food is 'cheaper' because the real costs are an impost on the commons and not incorporated into the ticket price. Dead zones of the planet due to fertiliser runoff eutrophication are a burden on the ocean commons, they are an uncosted harm of careless agriculture. It is a task for the future to cost the harms of pesticided food and farming and to build those costs into the ticket price to reflect the real cost.

Organic agriculture is low-input farming. It adheres to the CHEF principles of: Care, Health, Environment, and Fairness. These principles are likely to favour organic agriculture as so called 'carbon farming' and soil

carbon sequestration are monetised as climate change mitigation measures. The Covid-19 pandemic disruption and subsequent reset may also favour organic agriculture if the cost of farm chemical inputs sustain enduring price increases and disrupted availability.

The most prominent manifestation of organic agriculture is food, in all its guises. But besides food, there is the increasing proliferation of organics in the marketplace, into allied areas. These include organic textiles (cotton, wool, silk, linen et al.), organic cosmetics, organic pet food, and organic forestry products. Besides agriculture, there is wildculture, aquaculture, and silviculture as organics migrates across the full realm of food and fibre harvesting and production.

Conclusion

The contest of organic versus chemical farming was grounded by Lord Northbourne when he declared that: "We must remember that food of better quality is food which has vitality, individuality, freshness; food which is grown right, not only food that looks right; food which is effective as a vehicle of life and is not either mere stimulant or mere filling" (Northbourne, 1940).

To reach the food production system of the future, even in the midst of the conflagration of WW2, Lord Northbourne had the prescience to maintain that: "We have tried to conquer nature by force and by intellect. It now remains for us to try the way of love" (Northbourne, 1940). Despite the elapse of eight decades, Northbourne's book, 'Look to the Land' remains a treatise of wise and worthy aspiration, a cogent argument for organic farming, and an enduring manifesto of organic farming.

Organic agriculture continues to face the headwinds of the mega-chemical industry, which offers 'silver-bullet' solutions, chemical solutions to biological problems of the complex enterprise of farming. Organic agriculture offers consumers food that is healthful and not contaminated with toxic residues. It offers farmers technologies for farming without poisoning the planet, and the benefit of a price premium for their produce.

References

Balfour, E. B. (1959). Diary of the 1959 New Zealand Tour, Part I. *Mother Earth*, 11(2): 169-194.

Carson, R. (1962). *Silent Spring*. Readers Union 1964 members' ed. London: Hamish Hamilton.

Chevriot, R. (1972). *Subject: Creation of an international Federation*. Typescript letter, 1 page, undated. Paris: Nature et Progrès.

Charles, D. (2005). *Master Mind: The rise and fall of Fritz Haber, the Nobel laureate who launched the age of chemical warfare*. Harper Collins Publishers, Ecco: New York.

Chief Minister's Office, Sikkim (2016). Under the leadership of India's greenest Chief Minister Shri Pawan Chamling - *Sustainable Development through Greening, Organic Farming and Unique Social Enginering*. Gangtok, India: Chief Minister's Office, Government of Sikkim.

EWG (Environmental Working Group), (2021). *EWG's 2021 Shopper's Guide to Pesticides in Produce*. EWG, Washington, DC.

GfK (Growth from Knowledge), (2017). *Decision Factors on What to Eat or Drink: Global GfK Survey* (October 2017). GfK, London.

Gross, D. (2008). *Our Roots Grow Deep: The story of Rodale*. Rodale Inc, Emmaus, PA.

Haber, F. (1920). *The Synthesis of Ammonia from its Elements*, in *Nobel Lectures, Chemistry 1901-1921*. Elsevier Publishing: Amsterdam, Netherlands, 326-340.

Hardin, G. (1968). The tragedy of the commons. *Science*, 162: 1243-1248.

Hurley, P. J. (1949). *An Encyclopaedia for Australian Gardeners*. Dymock's Book Arcade Limited, Sydney.

Hyland, C., Bradman A., Gerona R., Patton S., Zakharevich I., Gunier R. B., Klein K. (2019). Organic diet intervention significantly reduces urinary pesticide levels in U.S. children and adults. *Environ. Res.*, 171: 568-575.

IFOAM, (2020). *Join the Organic Movement Today*. IFOAM - Organics International. Bonn. www.ifoam.bio.

King, F. H. (1911). *Farmers of Forty Centuries, or Permanent Agriculture in China, Korea and Japan*. Bruce, J. P. (Ed). Madison, Wisconsin.

MoAF, (2017). *National Workshop on Roadmap for Organic Agriculture policy in Bhutan ongoing.* Ministry of Agriculture and Forests, Thimphu.

Nielsen, (2005). *Functional Foods & Organics: A global AC Nielsen online survey on consumer behaviour and attitudes*. ACNielsen.

Northbourne, Lord (1939). *Report of Proceedings - Summer School and Conference on Bio-Dynamic Farming: Home Farm, Betteshanger, Eastry, Kent*. Betteshanger: Summer School and Conference on Bio-Dynamic Farming.

Northbourne, Lord (1940). *Look to the Land*. Dent, London.

OFAI, (2018). *Final Report 19th Organic World Congress* 09-11th November 2017 International Expo Centre and Mart Greater Noida, UP. Organic Farming Association of India (OFAI), Goa.

PANUK, (2017). *Food for Thought: Pesticide Residues in the School Fruit and Vegetable Scheme (SFVS).* Pesticide Action Network UK (PANUK), Brighton, UK.

Paull, J. (2008). The lost history of organic farming in Australia. *J. Org. Syst.*, 3(2): 2-17.

Paull, J. (2010a). From France to the World: The International Federation of Organic Agriculture Movements (IFOAM). *J. Soc. Res. Policy*, 1(2): 93-102.

Paull, J. (2010b). The Future of Organic Agriculture: Otopia or Oblivion? *Innovative Science Editions*, 1: 11-14.

Paull, J. (2011a). The making of an agricultural classic: Farmers of Forty Centuries or Permanent Agriculture in China, Korea and Japan, 1911-2011. *Agricultural Sciences*, 2(3): 175-180.

Paull, J. (2011b). Attending the first organic agriculture course: Rudolf Steiner's Agriculture Course at Koberwitz, 1924. *Eur. J. Soc. Sci.*, 21(1): 64-70.

Paull, J. (2011c). The secrets of Koberwitz: The diffusion of Rudolf Steiner's Agriculture Course and the founding of Biodynamic Agriculture. *J. Soc. Res. Policy*, 2(1): 19-29.

Paull, J. (2011d). The Betteshanger Summer School: Missing link between biodynamic agriculture and organic farming. *J. Org. Syst.*, 6(2) : 13-26.

Paull, J. (2011e). The Soil Association and Australia: From Mother Earth to Eve Balfour. *Mother Earth*, 4 : 13-17.

Paull, J. (2013). The Rachel Carson letters and the making of Silent Spring. *Sage Open*, 3: 1-12.

Paull, J. (2014). Lord Northbourne, the man who invented organic farming, a biography. *J. Org. Syst.* 9(1) : 31-53.

Paull, J. (2015). The threat of genetically modified organisms (GMOs) to organic agriculture: A case study update. *Agric. Food*, 3: 56-63.

Paull, J. (2016). Organics olympiad 2016: Global indices of leadership in organic agriculture. *J. Soc. Dev. Sci.* 7(2): 79-87.

Paull, J. (2017). Four new strategies to grow the organic agriculture sector. *Agrofor International Journal*, 2(3): 61-70.

Paull, J. (2019). Organic Agriculture in Australia: Attaining the global majority (51%). *J. Environ. Prot. Sustain. Dev.*, 5(2) : 70-74.

Paull, J. (2020). The Koberwitzers: Those who attended Rudolf Steiner's Agriculture Course at Koberwitz in 1924, World's foundational organic agriculture course. *Int. J. Environ. Plan. Manag.*, 6(2) : 47-54.

Paull, J. (2020) Alfred Meebold: Bringing Anthroposophy to the Antipodes. *Harvests*, 72(1) : 36-41.

Paull, J. (2021). Organic agriculture - Invented in Kent. *Kent Maps Symposium*, 5 May. Canterbury Christ Church University.

Paull, J., and Lyons, K. (2008). Nanotechnology: the next challenge for organics. *J. Org. Syst.*, 2008. 3(1): 3-22.

Paull, J., and B. Hennig, B. (2019). World Maps of GMOs and Organic Agriculture. *International Sustainable Development Research Society (ISDRS) Newsletter*, (3): 6-8.

Paull, J., and Hennig, B. (2020). A World Map of Biodynamic Agriculture. *Agric. Biol. Sci. J.* 6(2): 114-119.

Pfeiffer, E. (1938a). *Practical Guide to the Use of the Bio-Dynamic Preparations*. Rudolf Steiner Publishing Co., London.

Pfeiffer, E. (1938b). *Bio-Dynamic Farming and Gardening: Soil Fertility Renewal and Preservation*. Anthroposophic Press, New York.

Pfeiffer, E. (1958). Preface, in Agriculture Course: *The Birth of the Biodynamic Method*, EIght lectures given in Koberwitz, Silesia, between 7 and 16 June 1924, Rudolf Steiner Press, UK, 5-16.

Putin, V. (2017). *The 25th APEC Economic Leaders' Meeting in Danang: Together Towards Prosperity and Harmonious Development* on 8 November, 2017. Kremlin, Moscow.

Rodale, J. I. (Ed) (1942). *Organic Farming and Gardening.* Rodale Press,Emmaus, Pennsylvania, 1(1):1-16.

Steiner, R. (1924a). *Agriculture Course*. Dornach, Switzerland: Goetheanum.

Steiner, R. (1924b). To All Members: The Meetings at Koberwitz and Breslau. *Anthroposophical Movement*, 1: 9-11.

Willer, H., and Yussefi, M. (Eds) (2000). *Organic Agriculture World-Wide: Statistics and Perspectives*. Stiftung Ökologie & Landbau (SÖL): Bad Durkheim, Germany.

Willer, H., J. Trávníček, C. Meier, B. Schlatter, (Eds) (2021). *The World of Organic Agriculture: Statistics & Emerging Trends 2021.* Switzerland: Research Institute of Organic Agriculture (FiBL), Bonn, Switzerland & IFOAM-Organics International, Frick. Germany.