

A World Map of Biodynamic Agriculture

John Paull^{1, *}, Benjamin Hennig²

¹Environment, Resources & Sustainability, University of Tasmania, Hobart, Australia

²Life and Environmental Sciences, University of Iceland, Reykjavik, Iceland

Abstract

A world map of biodynamic agriculture is presented. The map accounts for 55 countries and a world total of 251,842 certified biodynamic hectares. Biodynamic farming is the progenitor of organic agriculture. Ground-zero for biodynamics and organics is the *Agriculture Course* presented in the summer of 1924 by Dr Rudolf Steiner (1861-1925) to a group of 111 farmers and others at Koberwitz, Germany (now Kobierzyce, Poland). Rudolf Steiner called for a natural agriculture rejecting the prevailing thrust for the chemicalization of agriculture, evidenced, at the time, particularly by the uptake of synthetic fertilisers. Steiner's "hints" have evolved into a suite of farming practices now called 'biodynamic' (BD) agriculture. One BD practitioner, Lord Northbourne, coined the term 'organic farming' (in 1940) and presented his manifesto of organic agriculture, *Look to the Land*, which has spawned the international alternative agriculture movement of organic farming. Germany leads the world with 84,426 BD hectares, followed by Australia with 49,797 BD ha, and France with 14,629 BD ha. Steiner's particularised form of organic agriculture, viz. biodynamic farming, is a subset (of 30.0% and 0.35% respectively) of the 186 countries which account for a global total of 71,514,583 certified organic hectares. A table of countries and associated BD hectares is included. All hectare data reported in the present paper are for certified operations. The map presented is an area cartogram. The size and scope of the uncertified biodynamics and organics sectors remain undetermined.

Keywords

Organic Agriculture, Organic Farming, Cartography, Cartograms, Statistics, Rudolf Steiner, Germany, Australia

Received: April 10, 2020 / Accepted: May 9, 2020 / Published online: June 9, 2020

@ 2020 The Authors. Published by American Institute of Science. This Open Access article is under the CC BY license.

<http://creativecommons.org/licenses/by/4.0/>

1. Introduction

Biodynamic farming is the progenitor of organic agriculture. Reflecting on the, then, recent experience of the First World War (1914-18), the New Age philosopher Dr Rudolf Steiner (1861-1925) wrote that: "After such an experience, retrospection is in order, for this experience has proved that the opinions of half a century, especially the dominant thoughts of the war years, to be tragically erroneous" [1: xi].

In the summer of 1924, in what would be one of his final innovations, Rudolf Steiner presented his Agriculture Course, the world's first organic agriculture course, to a group of 111

farmers, and others, in the village of Koberwitz, near Breslau, Germany (now Kobierzyce, near Wrocław, Poland) [2, 3].

Rudolf Steiner called for a differentiated agriculture which rejected the prevailing adoption of synthetic chemicals for food production. Steiner presented his audience with a series of what he called "hints" for the development of such a differentiated agriculture [4]. By the time of the Koberwitz course, Steiner's health was faltering. He never repeated his *Agriculture Course*, nor did he have the opportunity to expand on it. His health deteriorated and he retreated to his sick bed a few months after the course, permanently as it turned out, and he died on 30 March 1925.

In the decades that followed the Koberwitz course, adherents of Rudolf Steiner, from around the world put his "hints" to

* Corresponding author
E-mail address: j.paull@utas.edu.au (J. Paull)

the test, as he had urged [5-8]. Dr Ehrenfried Pfeiffer, based at the Goetheanum in Dornach, Switzerland, oversaw this global enterprise of testing and development, and he published *Biodynamic Farming and Gardening* in 1938 [9, 10].

An Oxford University trained agriculturalist, Lord Northbourne (Walter James) (1896-1982), travelled to Switzerland to visit Ehrenfried Pfeiffer and invited him to present a biodynamics course in England. That course, the Betteshanger Summer School on Biodynamic Farming, in July 1939, was an opportunity for Pfeiffer and his colleagues to present biodynamics to an English audience. Shortly after Betteshanger, the outbreak of WW2 brought such collaborations to a close for the near future, and dampened the English appetite for Germanic ideas.

The following year, in May 1940, Lord Northbourne published his own book, *Look to the Land*, where he introduced the term “organic farming” [11]. Rudolf Steiner had characterised ‘the farm as an organism’ in 1924 and Northbourne’s ‘organic farming’ of 1940 was an appropriate coinage [12, 13]. Northbourne’s book is an enduring manifesto of organic agriculture, and his terminology has prevailed. The practice of organic agriculture is now reported from 186 countries and accounts for 71,514,583 hectares [14].

Biodynamic agriculture is a subset of organic agriculture. It is differentiated by subscribing to various of the practices, including the application of BD preparations, suggested by Rudolf Steiner in 1924, and developed by adherents including Ehrenfried Pfeiffer [9] and Lili Kolisko [15].

In the present paper, the authors present the first world map of biodynamic agriculture. It is a companion to the prior publications of world maps of organic agriculture [16].

2. Methods

Demeter International have provided most of the data used in this study. Demeter International is the world’s leading biodynamics certifier, however, for historical reasons its collations of global biodynamics statistics lack Australian data, and are therefore incomplete. The Demeter name and logo date back in Europe to 1928 for biodynamics enterprise [17]. However, in Australia, the Demeter name and logo were appropriated by Alex Podolinski (1925-2019) when he registered and trademarked them in 1968 without acknowledgement or permission of the originating European entity. This was despite the practice of biodynamics dating from 1928 in Australia by Ernesto Genoni (1885-1975), and the Demeter name being used for decades in Australia, since 1934, by Ernesto Genoni and Ileen Macpherson (1898-1984)

[5, 18, 19].

At present, three organic certifiers in Australia certify to a biodynamic standard: Australian Demeter Bio-Dynamic, Australian Certified Organic (ACO), and the National Association of Sustainable Agriculture Australia (NASAA). For the present study, unpublished biodynamics data has been kindly supplied by these three Australian certifiers and aggregated by the authors.

The biodynamics cartogram of the present paper (Figure 1) is created by beginning with a Peters projection of the world (the reference map, Figure 3). In such a map, equal areas of the map represent equal territorial areas of the world (i.e. countries on the map are represented true to their actual size relative to other countries [20], as distinct from, for example, a Mercator projection where territories are progressively more distorted as the poles are approached. The Peters projection map is a density equalising map, where the density of the parameter mapped (territorial area) is equal across the whole map. Conceptually, the territories are then deflated of their territorial area, leaving the territorial ‘bladders’ empty, and then re-inflated with the new parameter under examination, in this case, biodynamic hectares. The original total area evacuated is conserved (i.e. replaced) in the new biodynamics map.

In the event that the new parameter (biodynamics) is globally distributed proportionate to the territorial area, then the map of the new parameter will be unchanged (from the reference map). Where the new parameter is more dense in a territory (than the global density of the new parameter) then that territory will appear fatter in the new map. Where the new parameter is less dense in a territory (than the global density of the new parameter) then that territory will appear slimmer in the new map. The present authors have previously produced such maps using the worldmapper algorithm <worldmapper.org> [16, 21, 22].

The data mapped appear in Table 1.

3. Results

The novel outcome of this research is the map of global biodynamic hectares, presented as Figure 1. This is a density equalising cartogram, also known as an area cartogram. The data driving this map are presented in Table 1. Biodynamic hectares in 55 countries are accounted for with a global total of 251,842 certified biodynamic (BD) hectares.

Europe dominates the world map of biodynamics. Germany leads the world with 84,426 BD hectares (34% of the world total), followed by Australia with 49,797 BD ha (20%), and France with 14,629 BD ha (6%).

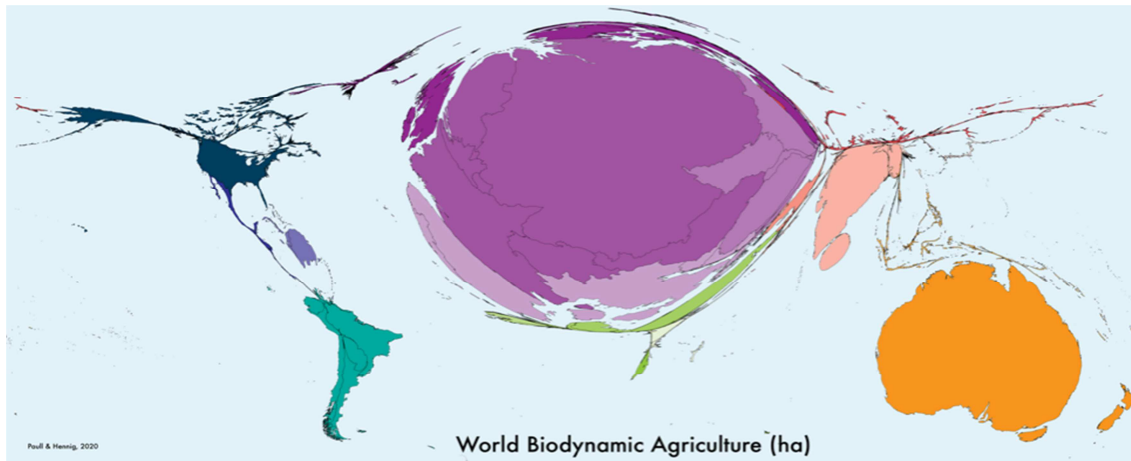


Figure 1. World Map of Biodynamic Agriculture.

Biodynamic farming, Rudolf Steiner's particularised form of organic agriculture, is reported in a subset of 55 countries (30.0%) of the 186 countries that report organic agriculture, and in a subset of 251,842 certified biodynamic hectares (0.35%) of the global total of 71,514,583 certified organic hectares. By way of comparison, a World Map of Organic Agriculture is presented, as Figure 2, which has Australia dominating the world map and Europe as a strong but less dominant presence [23]. A reference map for the cartograms

is presented as Figure 3 which shows countries in a more familiar guise.

At the Koberwitz course of 1924, there were attendees from six European countries, viz. Germany (n=61), Poland (n=30), Austria (n=9), Switzerland (n=7), France (n=2), and Sweden (n=2) [3]. All of the original 6 countries are still represented (Table 1). The count of participating countries has grown by a further 49 countries in the intervening near-century (Table 1).

Table 1. World data for Biodynamic Agriculture.

Countries listed alphabetically		Countries ranked by BD hectares	
COUNTRY	BD HECTARES	COUNTRY	BD HECTARES
Argentina	1,187	Germany	84,426
Australia	49,797	Australia	49,797
Austria	7,164	France	14,629
Belgium	143	Italy	10,781
Brazil	3,388	India	9,303
Chile	1,474	United States	9,001
China	108	Netherlands	8,681
Colombia	106	Spain	7,743
Costa Rica	11	Austria	7,164
Croatia	68	Hungary	6,371
Czech Republic	3,537	Switzerland	5,070
Denmark	2,998	Poland	4,261
Dominican Republic	1,410	United Kingdom	3,886
Ecuador	512	Czech Republic	3,537
Egypt	2,610	Brazil	3,388
Ethiopia	32	Denmark	2,998
Finland	384	Egypt	2,610
France	14,629	Sri Lanka	1,479
Germany	84,426	Chile	1,474
Greece	381	Dominican Republic	1,410
Guinea-Bissau	694	Lithuania	1,389
Honduras	72	Argentina	1,187
Hungary	6,371	Turkey	1,148
India	9,303	Paraguay	996
Iran	72	New Zealand	928
Ireland	93	Sweden	873
Israel	106	Tunisia	699
Italy	10,781	Guinea-Bissau	694
Liechtenstein	3	Portugal	574
Lithuania	1,389	Norway	548
Luxembourg	536	Luxembourg	536

Countries listed alphabetically		Countries ranked by BD hectares	
COUNTRY	BD HECTARES	COUNTRY	BD HECTARES
Mexico	304	Uganda	527
Morocco	27	Ecuador	512
Nepal	118	Finland	384
Netherlands	8,681	Greece	381
New Zealand	928	Peru	307
Norway	548	Mexico	304
Paraguay	996	South Africa	245
Peru	307	Slovenia	238
Poland	4,261	Romania	200
Portugal	574	Slovakia	169
Romania	200	Belgium	143
Serbia	35	Nepal	118
Slovakia	169	China	108
Slovenia	238	Colombia	106
South Africa	245	Israel	106
Spain	7,743	Ireland	93
Sri Lanka	1,479	Honduras	72
Sweden	873	Iran	72
Switzerland	5,070	Croatia	68
Tunisia	699	Serbia	35
Turkey	1,148	Ethiopia	32
Uganda	527	Morocco	27
United Kingdom	3,886	Costa Rica	11
United States	9,001	Liechtenstein	3
TOTAL	251,842	TOTAL	251,842

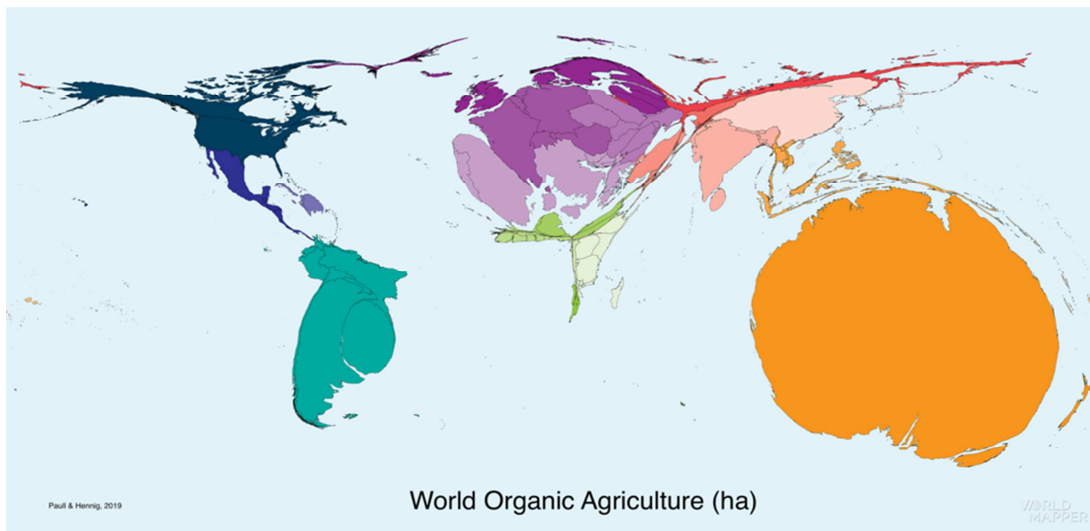


Figure 2. World Map of Organic Agriculture [source: 24].

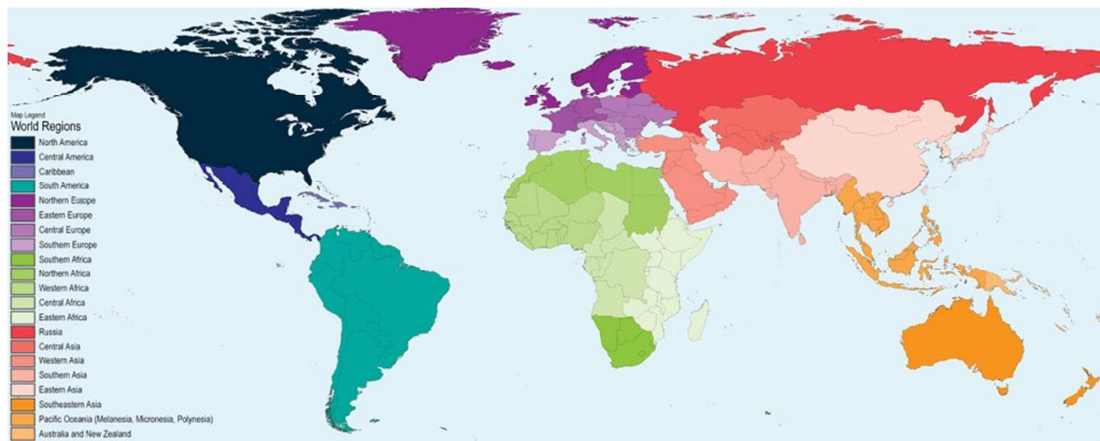


Figure 3. World Reference Map (Peters projection).

4. Discussion

The biodynamics map (Figure 1) is dramatically different from the 'standard' map (Figure 3) of the world. This illustrates that although BD has diffused throughout much of the world, that diffusion has been very uneven. Europe was the foundational region for biodynamics and, nearly a century later, Europe still dominates the global uptake of biodynamics. Countries (e.g. Russia & China) and regions that appear skeletal in the map reflect the low or nil diffusion of biodynamics there. Countries (e.g. Germany & Australia) or regions that appear inflated indicate that the diffusion of biodynamics is higher there than the global average diffusion.

The reported statistics for both organic agriculture and its progenitor, biodynamic agriculture, which inform the present paper, are underestimates because the statistics capture only certified operations. So, they overlook the farms which are practicing these differentiated agricultures but are not certified. Certification is an impost, of cost and governance, on the operator. Certification is an opt-in choice of the operator, with the exception only of Sikkim, India, where the whole state is organic by government decree [26, 27].

Certification provides third-party oversight of compliance with an agreed set of objective standards to be met by operators. For the operator, certification achieves a price premium, and for the consumer certification assures compliance and quality. Reasons for non-certification include, cost, opportunity, access, literacy, privacy, and size of operation. For an operator, the choice to certify or not may be reduced to an economic decision based on the cost/benefit equation. The topics of statistics, uptake, diffusion and certification for biodynamics warrant further research.

5. Conclusion

Rudolf Steiner's impulse of 1924 for natural agriculture has endured across time and space, with presently more than a quarter of a million certified biodynamic hectares, which are a part of 71.5 million certified organic hectares. Biodynamics, along with its progeny, organic agriculture, has proven to be responsive to changing circumstances and agri-technologies, with presently five exclusions: synthetic fertilisers, synthetic pesticides, irradiation, genetically modified organisms (GMOs), and nanotechnology.

Rudolf Steiner's intent was that his differentiated agriculture was for "all farmers" [25: 5]. That remains a distant goal. Nevertheless the legacy of biodynamics and organics, initiated by an Austrian philosopher, in a course of eight lectures, almost a century ago, in an obscure village of Silesia, demonstrates the power of an idea whose time had come.

Acknowledgements

The kind assistance of Demeter International, Australian Demeter Bio-Dynamic, Australian Certified Organic (ACO), and the National Association for Sustainable Agriculture Australia (NASAA) for supplying certification data is acknowledged. The Worldmapper algorithm was used for creating the cartograms. The biodynamics map of this paper will be available for free download and free use under a CC-BY-4.0 licence at <commons.wikimedia.org/>.

References

- [1] Steiner, R., *The Spirit of the Waldorf School: Lectures Surrounding the Founding of the First Waldorf School, Stuttgart, 1919, and An Essay from The Social Future, 1920.* 1995, Hudson, NY: Anthroposophic Press.
- [2] Steiner, R., *Agriculture Course.* 1924, (1929, first English language edition; trans George Kaufmann). Dornach, Switzerland: Goetheanum.
- [3] Paull, J., Attending the first organic agriculture course: Rudolf Steiner's Agriculture Course at Koberwitz, 1924. *European Journal of Social Sciences*, 2011. 21 (1): p. 64-70.
- [4] Steiner, R., *To All Members: The Meetings at Breslau and Koberwitz; the Waldorf School; the longings of the Youth.* Anthroposophical Movement, 1924. 1: p. 17-18.
- [5] Paull, J., Ernesto Genoni: Australia's pioneer of biodynamic agriculture. *Journal of Organics*, 2014. 1 (1): p. 57-81.
- [6] Paull, J., The pioneers of biodynamics in New Zealand. *Harvests*, 2018. 70 (3): p. 38-40.
- [7] Paull, J., The pioneers of Biodynamics in USA: The early milestones of Organic Agriculture in the United States. *American Journal of Environment and Sustainable Development*, 2019. 6 (2): p. 89-94.
- [8] Paull, J., The Pioneers of Biodynamics in Great Britain: From Anthroposophic Farming to Organic Agriculture (1924-1940). *Journal of Environment Protection and Sustainable Development*, 2019. 5 (4): p. 138-145.
- [9] Pfeiffer, E., *Bio-Dynamic Farming and Gardening: Soil Fertility Renewal and Preservation.* 1938, New York: Anthroposophic Press.
- [10] Paull, J., *Biodynamic Agriculture: The journey from Koberwitz to the World, 1924-1938.* *Journal of Organic Systems*, 2011. 6 (1): p. 27-41.
- [11] Northbourne, Lord, *Look to the Land.* 1940, London: Dent.
- [12] Paull, J., The farm as organism: the foundational idea of organic agriculture. *Journal of Bio-Dynamics Tasmania*, 2006. (80): p. 14-18.
- [13] Paull, J., Lord Northbourne, the man who invented organic farming, a biography. *Journal of Organic Systems*, 2014. 9 (1): p. 31-53.

- [14] Willer, H., et al., eds. *The World of Organic Agriculture: Statistics and Emerging Trends 2020*. 2020, Switzerland: Research Institute of Organic Agriculture (FiBL) & Bonn, Germany: IFOAM-Organics International: Frick.
- [15] Kolisko, E. and L. Kolisko, *Agriculture of Tomorrow*. 1978, Bournemouth: Kolisko Archive Publications.
- [16] Paull, J. and B. Hennig, Atlas of Organics: Four maps of the world of organic agriculture. *Journal of Organics*, 2016. 3 (1): p. 25-32.
- [17] Demeter, *History*. 2017, Darmstadt, Germany: Demeter International.
- [18] Paull, J., Australia's original Demeter Farm (1934-1954). *Journal of Biodynamics Tasmania*, 2017. September (123): p. 16-19.
- [19] Paull, J., Ileen Macpherson: Life and tragedy of a pioneer of biodynamic farming at Demeter Farm and a benefactor of Anthroposophy in Australia. *Journal of Organics*, 2017. 4 (1): p. 29-56.
- [20] Peters, A., *Die Neue Kartographie/The New Cartography*. 1983, (dual text: in German and English); Klagenfurt, Austria: Carinthia University; New York Friendship Press: Friendship Press.
- [21] Paull, J. and B. Hennig, *World Maps of GMOs and Organic Agriculture*. International Sustainable Development Research Society (ISDRS) Newsletter, 2019. 2019 (3): p. 6-8.
- [22] Paull, J. and B. Hennig, Rudolf Steiner Education and Waldorf Schools: Centenary World Maps of the Global Diffusion of "the School of the Future". *Journal of Social Sciences and Humanities*, 2020. 6 (1): p. 24-33.
- [23] Paull, J., Organic Agriculture in Australia: Attaining the global majority (51%). *Journal of Environment Protection and Sustainable Development*, 2019. 5 (2): p. 70-74.
- [24] Paull, J. and B. Hennig, New world map of organic agriculture: Australia is 51%. *Acres Australia*, 2019. 101: p. 35-36.
- [25] Pfeiffer, E., *New Directions in Agriculture*, in *Bio-Dynamic Gardening and Farming: Articles by Ehrenfried Pfeiffer*, Volume 1. 1983, Mercury Press: Spring Valley, NY.
- [26] Chamling, P., *Sikkim Organic Mission 2015*. 2010, Gangtok, India: Food Security & Agriculture Development Department, Government of Sikkim.
- [27] Paull, J., Four new strategies to grow the organic agriculture sector. *Agrofor International Journal*, 2017. 2 (3): p. 61-70.