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RESEARCH ARTICLE

Agroecology: Biodynamics as the Trail Blazer (1924–1938)

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ABSTRACT

In a series of eight lectures in 1924, Dr. Rudolf Steiner (1861–1925) laid the foundations for Biodynamics, and thereby for the awakening of an Agroecology Movement. Steiner called for pushback against post-WWI chemically dependent farming and called for biologically focused farming. He urged farmers to regard the farm as 'an organism', he proposed some specific compost and field preparations to facilitate biological processes, called for experiments to determine what worked in practice, and called for the broad advocacy and uptake of this newly differentiated agriculture. By 1938 (shortly before the outbreak of WWII), Steiner's agriculture had achieved differentiation by name (Biodynamic farming), market branding and a logo (Demeter), production standards and certification, a body to oversee the standards, a body to manage experiments, and producers, advocacy groups, and handbooks in multiple languages. In the years 1924 to 1938, the 5-point infrastructural elements (Certification, Logo, Advocacy, Name differentiation, and Standards (CLANS)) of this foundational agroecology were invented and put into practice. With these agro-innovations, Biodynamics laid the foundations for itself and future varieties of agroecology. When, in 1940, a Biodynamic farmer coined the term 'organic farming,' the 5-point CLANS infrastructure model for a differentiated agriculture was already well-formed, developed, and implemented, and ready for emulation. Green Food in China, founded in 1990, also followed the CLANS model. Biodynamics was the first mover in agroecology, and its devotees pioneered eco-certification, eco-labeling, eco-advocacy, and eco-standards. Biodynamics was the prototype and the trailblazer for the diversity of agroecologies that have followed.

Keywords: Anthroposophy, organic agriculture, Rudolf Steiner, sustainable agriculture.

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1. Introduction

On a Venn diagram, Agroecology is a somewhat 'fuzzy' edged domain (Fig. 1). Fuzzy because just what is 'in' and what is 'out' of the Agroecology realm is contested. For example, can agro-technologies such as genetically modified organisms (GMOs), nanotechnology, and irradiation, be 'in'? The reward for sitting within the Agroecology realm is that a particular agro-tech becomes normalised and even valorised (whereas in reality, there is considerable consumer resistance to these agro-tech innovations). Just where are the boundaries for 'sustainable agriculture' and 'regenerative agriculture'? These boundaries are contested (and it is not the object of the present study to resolve such boundary issues).

While Agroecology, per se, is broadly and loosely defined as "a science, a movement, and a practice" [1], its three leading exemplars, Biodynamics, Organics, and Green Food, are quite precisely defined. These three mature agroecologies are well differentiated from each other and from chemical agriculture. On a Venn diagram, these three agroecologies all sit fully within the Agroecology realm, with Biodynamics nested within Organics, and Organics nested within Green Food (Fig. 1).

Each of the three leading Agroecology exemplars is quite precisely defined. The present study reveals that the accoutrements of these three mature agroecologies of the present time (viz. Biodynamics, Organics, and Green Food) have five accoutrements in common (viz. Certification and certifiers, marketing Logos, Advocates and handbooks, Name differentiation, and Standards (CLANS)) and that

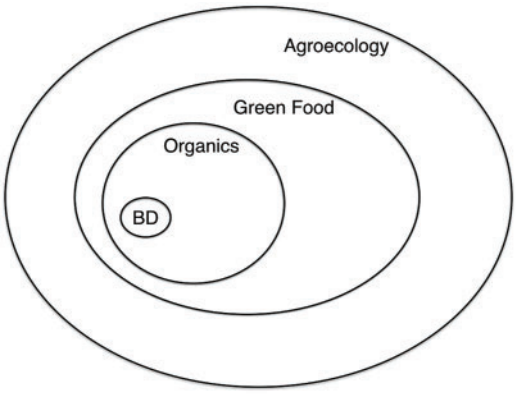

Fig. 1. Venn diagram of Agroecologies (image source: author).

Fig. 2. Dr Rudolf Steiner (image source: Biodynamic Association, UK).

this 5-point architecture for an agroecology was invented by the pioneers of Biodynamics between the years 1924 and 1938.

Germany entered the Twentieth Century with the 'biggest and best' chemical industry in the world. And for 'The Great War' (later known as World War I and WWI) Germany 'put its best chemistry forward.' The Haber-Bosch process of 1909 enabled the fixing of 'nitrogen' from the air [2]–[4]. The output of the Haber-Bosch process meant that, at long last, Germany could be self-sufficient in explosives (and that the manufacture of explosives would not be dependent on shipping and thereby not vulnerable to a blockade).

Germany entered WWI, the 'Chemists' War,' with not only the industrial capacity to manufacture cheap and abundant explosives but also with novel chemical-warfare weapons, viz. poison gases capable of blinding, disabling, and killing 'the enemy' [5]. In the end, the chemistry advantage of Germany was insufficient for a victory; but that point was only finally arrived at after the catastrophe of more than four years of war and the deaths of 15 to 22 million soldiers and civilians, and 23 million disabled [6].

After WWI, the 'Chemists' War' was promptly repurposed as the 'Chemists' Agriculture.' The munition feedstocks of war could be repurposed as synthetic fertilizers. The poison gasses of the battlefield could be repurposed as synthetic pesticides for the farm-field [7], [8]. In this way, the catastrophic labour losses to death and disability of so many (mostly) young men could be substituted with the labour-saving promises of agro-chemistry. In the century since WWI, the agro-chemistry industry has grown to become one of the world's most ubiquitous, pervasive, and wealthy industries, spurred on by the chemical warfare innovations of WWII (e.g., DDT) and the Vietnam War (e.g., Agent Orange) [9].

Up until the early Twentieth Century, agriculture was (more or less) practiced as agroecology; it was 'heritage agroecology' or 'agroecology-by-default' and chemical inputs were few and 'natural' and farming was pursued as a craft on a human scale rather than as an industry on an industrial scale [e.g., 10]. The emphasis was on biology, soil, seasons, stewardship of the farm and its plants, and animals. This 'heritage agroecology' of the forefathers was never perfect, but it was generally natural rather than synthetic, and non-toxic rather than toxic.

The 'heritage agroecology' of past millennia only morphed into a self-aware 'Agroecology Movement' with the advent of the agrochemistry industry of the Twentieth Century. The Agroecology Movement is a pushback against the chemicalisation and industrialisation of agriculture, the change in scale of operations, and the change from natural inputs to synthetic inputs. The Agroecology Movement is a diverse and disparate movement that nevertheless holds, in common, as an act of faith, that we cannot poison our way to health and prosperity, and that there are better ways to 'feed the planet'.

The period immediately post-WWI was a time of great social unease throughout Europe and elsewhere. Germany had been smashed, there was social unrest, unprecedented disability, malnourished children, unemployment, runaway inflation, and the fear (or hope) of communism. The 'magic bullets' of synthetic fertilizers and synthetic pesticides were attractive to many, but not all, and that view persists to the present day, hence agroecology and an Agroecology Movement.

Into the milieu of social unrest and the resurgent German chemical industry, which was busy reinventing itself as the 'saviour' of agriculture, stepped the Austrian philosopher, Dr. Rudolf Steiner (1961–1925) (Fig. 2). He was neither a farmer, nor a gardener, nor a chemist. He was, nevertheless, a remarkable polymath of his day, bristling with New Age ideas and insights ripe for reification. He was invited to lecture to farmers, who were unsettled by the chemical agriculture of the day, at the obscure and unremarkable village of Koberwitz (at the time near Breslau in Eastern Germany; now it is Kobierzyce near Wrocław in Western Poland) [11] (Fig. 3).

Biodynamics is by any measure a 'bit player' in the modern Agroecology Movement, but it was the first-mover and played the seminal role in the aetiology and ontogeny of the Agroecology Movement as it single-handedly pioneered the 5-point architecture of Certification, Logo, Advocacy, Name differentiation, and Standards (CLANS) to create an agroecology with a presence in the marketplace.

2. Methods

The present account draws on resources and historical material held in various libraries, archives, and personal

Fig. 3. The 'Kobierzyce Palac' on the occasion of the Koberwitz Centenary 1924–2024 (image source: J. Paull).

collections. These include the Bodleian Library (University of Oxford), British Library (London), Reading University Library (Reading, UK), Hampshire Record Office (Winchester, UK), the Rudolf Steiner Archiv (Dornach, Switzerland), Goetheanum Documentation (Bibliothek und Archiv) (Dornach), and WorldCat (worldcat.org). Wherever possible, original sources are cited.

'Agroecology' is used in the present paper as a 'grab-bag' of terms which each have in common various levels of 'push-back' against industrial-chemical-agriculture. The term 'Agroecology Movement' is used as an umbrella term embracing the diversity of philosophies and practices that collectively aspire to food, farming, and agriculture without synthetic chemical inputs. 'Agroecology Movement' is used as a collective noun embracing various iterations, including (but not limited to) Biodynamic farming, organic agriculture, Green Food, Permaculture, regenerative agriculture, and sustainable agriculture. Of these six exemplars of agroecology, Biodynamics, Organics, and Green Food are mature exemplars adopting a 5-fold CLANS complement of Certification schemes, marketing Logos, Advocacy, Name differentiation, and Standards, along with a production base and an identifiable market presence.

'Organic farming,' 'Organic agriculture,' and 'Organics' are used interchangeably. 'Biodynamic farming', 'Biodynamic agriculture,' 'Biodynamics,' and 'BD' are used interchangeably. Biodynamics is a subset of Organics (Biodynamics is 'Organics Plus' with the 'Plus' being the mandated use of BD preparations). Green Food is 'Organics Minus' with some laxity and derogation compared to Organics. Anthropop is used as an abbreviation of 'Anthroposophist' or 'Anthroposophical,' depending on the context; an Anthroposophist is a member of the General Anthroposophical Society (GAS) based in Dornach, Switzerland.

3. Results

Koberwitz was ground-zero for the future Agroecology Movement. In response to the blossoming chemical agriculture of the day, and an invitation from concerned Anthropop farmers, Dr. Rudolf Steiner (1861–1925) delivered a suite of eight lectures, 'The Agriculture Course', in Germany at the otherwise unremarkable village of Koberwitz, near Breslau. It is now Kobierzyce in Poland (Germany lost WWII, and the territory was ceded) [12], [13].

3.1. BD Beginning

Rudolf Steiner was neither farmer, nor gardener, nor chemist, nor businessman; yet his Agriculture Course was initiated by farmers, and, of the audience of 111, many were farmers [14]. The Course was hosted at the farming estate managed by Count Carl Keyserlingk.

Steiner was a polymath, a man with a remarkable breadth of knowledge, insight, and charisma. His task at Koberwitz was to reveal what light his 'spiritual science' of Anthroposophy could throw on the farming practices of the time and for the future [15], [16].

In his Course, Rudolf Steiner advocated for an agriculture that treated the farm as 'an organism', and which relied on biology rather than chemistry. He called for the agriculture of his acolytes to be differentiated from that promulgated by the chemical companies. He proposed the use of specific biological compost and field treatments [17]. There was no dogma. Steiner called for experiments to test his ideas and to reveal what worked in practice, and then the publication of the results and propagation of this yet-to-be-named agriculture. In Britain, the advocacy group to progress Steiner's ideas (in the absence of a name) was founded as the 'Anthroposophical Agricultural Foundation' [18] (this was always to be a name in transition since Steiner had stated that while this new agriculture was to be a daughter of Anthroposophy, it was nevertheless to be independent).

The Agriculture Course was presented in the summer of 1924 (7–20 June) to card-carrying Anthroposophists. Three months later (30 September), Steiner retired from public life (due to illness). Six months later (30 March, 1925), Steiner passed away [19]. As a consequence of Steiner's indisposition and death, the Agriculture Course was never repeated, and Steiner was not present to guide his new enterprise.

3.2. BD Research

At the Agriculture Course, Rudolf Steiner oversaw the founding of the 'Experimental Circle of Anthroposophical Farmers and Gardeners' with the view to test what Steiner called the "hints" presented in the Course [16, p.10]. The Experimental Circle began with the sign-on of about 60 farmers who attended the Course. The task of the Experimental Circle was to put the ideas to the test, to maintain confidentiality of the Course contents, and in the fullness of time to publish the results of practices that were proven to work. By the end of 1938, the Experimental Circle had grown to more than 700 members [20].

Members of the Experimental Circle were required to be members of the General Anthroposophical Society (GAS), to sign a Non-Disclosure Agreement (NDA), and to nominate where their experiments were to be carried out. Most Experimental Circle members were farmers, gardeners, or Anthropop enthusiasts, and very few were scientists.

It is arguable that the imposed secrecy inhibited the recruitment of scientists to design, conduct, and analyse experiments. The few scientists that were recruited to test Biodynamics and the BD preparations struggled to demonstrate the superiority of Biodynamics, as for example, the experiments commissioned by Carl Vett [21]. Results that were shared were generally of the before-and-after variety (so that weather and seasonal differences were not controlled), rather than side-by-side comparisons as per, for example, the results of Ernst Stegemann and Immanuel Voegele [22]–[24].

Ehrenfried Pfeiffer of the Natural Science Section of the Goetheanum at Dornach, Switzerland, oversaw the experimental testing and development of Biodynamics in the years between WWI and WWII. However, it appears that no trove of experimental BD data curated by Pfeiffer has survived the passage of time. Pfeiffer published his book 'Bio-Dynamic Farming and Gardening' in 1938, arguably extinguishing the NDA.

3.3. BD Invents CLANS

Rudolf Steiner left to his newly-minted devotees of a differentiated New Age agriculture: (a) a transcript, (b) the beginnings of an innovative distributed research entity (the Experimental Circle) along with a brief, (c) an international society of thousands of members (the General Anthroposophical Society (GAS)), and (d) his enduring charismatic shadow; but otherwise, little practical guidance. Steiner was mortally ill by the time of the Koberwitz Course, and, as a public figure, Rudolf Steiner vacated the stage within three months of the Course, never to return, and his death followed six months later.

Rudolf Steiner's modus operandi was to delegate. The Experimental Circle was tasked with determining which of Steiner's agricultural insights worked and then telling the world while maintaining secrecy until that time.

The great achievement of the Experimental Circle was to create a prototype agroecology 'from scratch'. There was no existing model. This pioneering task was achieved in the years 1924 to 1938 by a coterie of Biodynamics volunteers and amateurs.

By 1938, the 5-point architecture for an agroecology, Certification, Logo, Advocacy, Name differentiation, and Standards (CLANS), had been invented. It meant then (as it means now) that producers have guidance, standards to meet, and product differentiation via logo and certification. It meant that consumers can have confidence that produce that is differentiated at the point of sale and that they opt to purchase, likely at a price premium, has truly been differentiated in the process of production.

The BD 5-point CLANS innovation was not an 'ah ha' moment for Experimental Circlers. It developed as the needs arose, and over more than a decade. Farmers wanted recognition (standards and certification), consumers wanted assurance (logo and certification). This New Age agriculture needed producers, and they needed customers. Advocacy took various forms. There were newspaper articles, farm visits, advocacy groups, members-only conferences, dedicated journals, and prize-winning produce exhibited at local shows [18], [21], [25], [26]. Only in 1938, did Pfeiffer finally take BD to the public and unveiled the name as 'Bio-Dynamic' (soon to be dehypenated as 'Biodynamic').

3.4. BD Name

Steiner's New Age agriculture entered the world in 1924 as a nameless entity. Steiner called for his agriculture to be differentiated, but he did not propose a name. When the British BD advocacy group began (in 1928), the group was called the 'Anthroposophical Agricultural Foundation' [27]. It was a cumbersome name, but it was the best available at the time.

Over the following decade, various iterations were tried, generally reflecting the Germanic penchant for compound nouns. Variations of 'Biological-Dynamic' were eventually shortened to 'Bio-Dynamic' (in 1938) [28], [29] and ultimately to 'Biodynamic' and (mostly for insiders) just 'BD.'

3.5. BD Logo, Standards, and Certification

Before the name Biodynamics was settled, in 1938, 'Demeter' was registered as a trademark for marketing BD produce [25]. This coincided with the beginning of BD standards and certification. The name 'Demeter' is the Greek god of agriculture. Demeter appears to have been in use by 1928 [25], [30], [31]. The architecture for agroecology, developed in Germany in the 1920s and 1930s by Experimental Circle members, persists to the present; this is despite various Nazi bans and shutdowns during the 1930s and early 1940s of Rudolf Steiner books and of Anthroposophic ventures [32].

Both Biodynamics and Organics now share six exclusions: synthetic fertilisers, synthetic pesticides, irradiation, genetically modified organisms (GMOs), nanotechnology, and antibiotics.

BD is differentiated from Organics by the additional requirement to apply various BD preparations. The dual point of the standards, certification, and logo (certification mark) is firstly to maintain differentiation in the food chain and secondly to provide assurance to the customer. For the producer, it provides justification for a price premium and recognition that prescribed production practices have been adhered to.

3.6. BD Narrative

The BD canon comprises two books, viz. Steiner's 'Agriculture Course' [17] and Pfeiffer's 'Bio-Dynamic Farming and Gardening' [28]. They are not particularly well-written books, quite the contrary, nevertheless these two constitute the BD canon. There are numerous other BD books that have appeared since these two, but later contributions have most often not made it past a first edition [33].

The narrative of BD is maintained by the Agriculture Course itself. The words of Rudolf Steiner were recorded in shorthand by several Course attendees, including Kolisko et al. [34]. The notes were transcribed, and in the second edition (of 1929), the various accounts were reconciled [35]. Steiner died nine months after the Course, and the transcripts were not checked by him (as had been his general modus operandi for prior courses on various subjects). The second German-language edition of the Agriculture Course (of 1929) was the basis of the first English-language

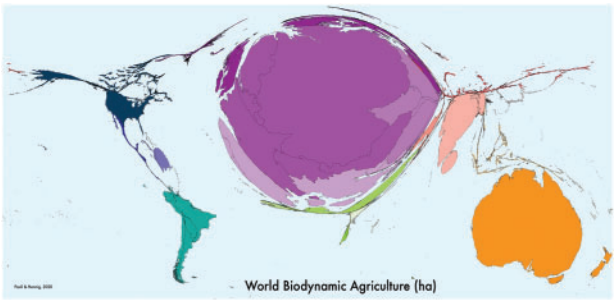

Fig. 4. Density equalising world map of Biodynamic agriculture (34% in Germany) (image source: [42]).

translation. The Agriculture Course has been continually in print for the past century, with editions appearing in at least 16 languages [36].

All the published works of Rudolf Steiner were banned by the Nazis in Germany in 1935 [37]. Such book bans were followed by the progressive shuttering by the Nazis of Anthropop ventures in Germany, including schools, special schools, lectures, publishing, and Biodynamics.

Ehrenfried Pfeiffer (1899–1961) did not attend the Course at Koberwitz; however, he took on the role at Anthropop headquarters, Dornach, as "Director of the Bio-chemical Research Laboratory" of the Natural Science Section of the Goetheanum [28]. Additionally, Pfeiffer took on the management of a BD farm of 320 hectares at Loverendale, Netherlands [38], [39].

It appears that pre-WWII, Pfeiffer personally judged that the time for BD secrecy had passed, and he published 'Bio-Dynamic Farming and Gardening' in 1938 [28]. Pfeiffer's book appeared simultaneously in five languages: English, German, Dutch, French, and Italian; none bore a Goetheanum imprint [29]. The following year, Pfeiffer's book appeared in a sixth language, Danish [21]. By this time, Pfeiffer's efforts at the Loverendale estate had floundered; he decamped to the USA and was never welcomed back into the Goetheanum fold. He was unsettled in his new life in the USA, and he died of tuberculosis in the USA without reconciling with Dornach [40], [41].

Neither the 'Agriculture Course' nor Pfeiffer's 'Bio-Dynamic Farming and Gardening' makes for compelling reading. The former is, after all, a mash-up of several shorthand transcripts of extemporaneous lectures of a century ago, and the latter is by a capable BD enthusiast, but it is translated from the German original, and the style is plodding.

The BD narrative has, nevertheless, had various capable advocates over the century, and the presentation of the BD narrative has often been to Anthropops and interested others and has been personally conveyed via courses, fieldwork, and social make-the-preparations events.

3.7. *BD World*

Steiner's instruction was to test his "hints", find out what works, publish the results, and tell the world [16, p.10]. BD is now practiced in 55 countries, accounting for 252,000 hectares. However, BD remains rather a Germanic phenomenon, with Germany accounting for 34% of global BD hectares [42] (Fig. 4).

Australia is second in BD-certified hectares, but it is an outlier. The Australian Demeter name and logo were appropriated in 1968, rather than authorised. A consequence is that Australian BD is unaccounted for in 'official' BD figures published by BFDI (Biodynamic Federation Demeter International), as though the Australian proliferation does not exist. And certainly, it does not pay dues to Germany.

3.8. *Organics*

Biodynamics finally went public in 1938. It was by then a mature agroecology with Certification, a Logo, Advocates, a Name, and Standards.

In contrast to Biodynamics, Organics went public with a name and a coherent manifesto (viz. 'Look to the Land') [43] from the outset (in 1940). Lord Northbourne, who coined the term and authored the manifesto, was an agriculture graduate of Oxford University and with an estate in Kent. He visited Ehrenfried Pfeiffer in Switzerland and invited him to conduct a Summer School on Biodynamics in Britain. The Betteshanger Summer School in July 1939 was the outcome. Pfeiffer presented a session on "The Farm as an Organism" [44], [45].

Northbourne was enthused by what he heard from Pfeiffer, but less than two months after the Betteshanger Conference, Germany invaded Poland on 1 September, 1939; Britain was at war once again [46]. Germanic ideas were, from that point, seriously out of favour in Britain. The following year, Northbourne published 'Look to the Land' [43]. His book introduced the term 'organic farming' and he wrote of a contest of "organic vs. chemical farming" [43]. His view was that this was a contest that might go on for decades, "for generations … perhaps for centuries" [43]. Northbourne jettisoned the esoteric content of Steiner's 'Agriculture Course' along the suite of preparations described in Pfeiffer's 'Bio-Dynamic Farming and Gardening' (and prescribed in BD certifications).

Unlike Biodynamics, which began as a secret society and was birthed into the public domain (by Pfeiffer in 1938), Organic agriculture was in the public domain from the outset, and 'Look to the Land' remains a compelling manifesto for Organics. It is crafted by an accomplished wordsmith who brings to the task both academic training in agriculture and practical experience in farming.

The mission of Organics was promptly taken up. In the USA, Jerome Rodale founded 'Organic Farming and Gardening' in 1942; it was the world's first periodical dedicated to Organics [47]. The 'Australian Organic Farming and Gardening Association' was founded in Sydney in 1944; it was the world's first advocacy group dedicated to Organics [48].

Organics had a ready-made and proven organisational prototype demonstrated in Biodynamics. The BD 5-point CLANS architecture was progressively adopted by Organics advocates around the world with Certification, marketing Logos on produce, Advocacy groups and journals, Names, and Standards, along with narratives, handbooks, and producers.

Organics is now practiced in 188 countries. It accounts for 99 million agricultural hectares, comprises 2.1% of global agricultural land, with 4.3 million producers, and

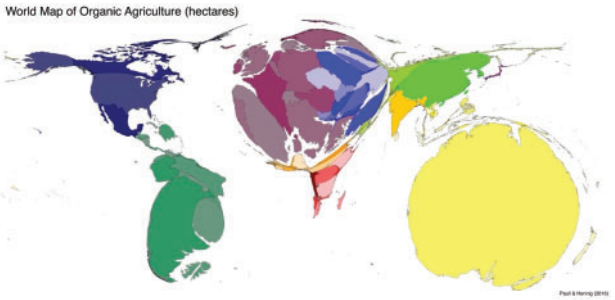

Fig. 5. Density equalising world map of Organic agriculture (188 countries practice Organics) (image source: [50]).

annual retail sales of €136 billion [49] (Fig. 5). The 'hard yards' had been done by Biodynamics in those years 1924 through 1938. The prototype was proven, and it was ripe for emulation, as the newfound Organics advocates adopted it as their own.

3.9. *Green Food*

Green Food is an agroecology specific to China. It dates from 1990. The China Green Food Development Centre (CGFDC) has managed the growth and market presence of Green Food since 1992 [51]. Green Food has followed the BD 5-point CLANS model of Certification, Logo, Advocacy, Name differentiation, and Standards. The eco-credentials of Green Farming are less than for Organics, but this 'lesser' certification for producers can facilitate articulation into a step-up to Organics.

Green Food can be described as an NQO (not quite Organic) agroecology, or an 'Organics Lite' with standards of production and certification that approach but may fall short of international Organics standards. Green Food is an agroecology created in China to bridge the gap between 'chemical agriculture' and organic agriculture. It accounts for 10.6 million hectares of production [52]. There are some advantages of a lesser standard (than Organics). It is easier for producers to qualify, Green Food certification facilitates a future transition to Organics, and it enables a backsliding Organics producer the opportunity to relinquish Organics certification yet retain some recognition and some differentiation from chemical agriculture as a Green Food producer [53].

3.10. *Further Agroecologies*

Besides the seminal agroecology of Biodynamics (from 1924), its daughter agroecology of Organics (from 1940), and China's agroecology of Green Food (from 1990), there have appeared further agroecologies. Others, including Permaculture, sustainable agriculture, and regenerative agriculture, are characterised by a higher degree of fuzziness and vagueness, and the lack of a full uptake of CLANS infrastructure. Perhaps in time they will 'find themselves' and their raison d'être or perhaps they serve to muddy the waters and detract from the mature agroecologies of Biodynamics, Organics, and Green Food?

It is tempting to dismiss the immature agroecologies of 'sustainable agriculture' and 'regenerative agriculture' as 'wandering generalities' lacking clarity of vision, lacking measurable uptake, and lacking clear definition and boundaries. They may in time mature into parameterised agroecologies, or they may serve as stepping stones for adherents to transition to existing mature agroecologies, or they may serve to mask un-ecological practices with sounds-good feels-good chatter while lacking commitment, discipline, and accountability. Perhaps all of the above, and only time will tell?

4. Concluding Remarks

Biodynamics was the original agroecology, the first bespoke named agroecology, creating the first eco-certification, eco-label, eco-advocacy, and eco-standards. Biodynamics was the trailblazer and prototype for the forthcoming diversity of agroecologies. By 1938, Biodynamics was a mature differentiated agroecology with Certification, marketing Logo, Advocacy, a differentiating Name, and Standards (CLANS).

Biodynamics had the first-mover advantage in the field of agroecologies. It was, however, slow to retreat from its birth as a secret society, and the first-mover advantage has been relinquished in the face of the uptake of Organics.

For Biodynamics, the CLANS accoutrements have remained centrally controlled (in Germany, excepting Australia). This Germanic centralisation has arguably hindered the acclimatisation of BD in foreign locales where the local agricultural practices, conditions, soils, climates, farm ownerships, culture, governance, and prevailing economic conditions may be quite un-Germanic. Despite that, Rudolf Steiner very specifically declared that his agricultural thoughts were "hints" and should be tested to find out what works; some BD devotees have instead taken Steiner's reported words as gospel and ritualised the folklore. Australia has taken an independent BD path from Germany, but has still been burdened by its history, but that is beyond the scope of the present paper.

Organic agriculture dates from 1940, and in the decades that followed, it somewhat slowly adopted all the agroecology architecture that had been developed and crafted by the Biodynamics pioneers in the years 1924 to 1938.

The Organics movement has gone on to outpace the Biodynamics movement on every index. Organics has a diversity of standards, they are often national standards, though they are generally in harmony. Organics has a diversity of logos, sometimes specific to a certifier, sometimes specific to a geographic region. For Organics, there is a diversity of certifiers, often offering a choice of certifiers within a single country.

The diversity of the Organics sector and its capacity to adapt to local conditions has facilitated its proliferation, generally with national ownership of logos, standards, and certifiers. Local ownership has meant local variations tailored to the local environment. This includes local certifiers, local certification practices, and local certification costs, as well as local derogations, taking into consideration the local conditions, possibilities, and expectations.

For Organics there is an overarching body, 'Organics International IFOAM' founded in 1972. The International Federation of Organic Agriculture Movements (IFOAM) was founded in France by four Organic associations and one Biodynamic association, to represent the Agroecology Movement internationally [54]. This agro-innovation

has seen the Organics sector grow in key parameters of hectares, farmers, and markets, as well as expanding into silviculture, aquaculture, and wild culture [49] (which BD has not).

Biodynamics, Organics, and Green Food are the three mature variants of the Agroecology Movement that have each adopted the 5-point CLANS infrastructure. Other variants of agroecology, including 'regenerative agriculture', Permaculture, and 'sustainable agriculture' have adopted some or much of the narrative (viz. 'natural', 'biological,' 'no synthetic chemicals') but not the complement of sectoral accoutrements of a mature movement, and whether they complement the realm of agroecology, or merely muddy the waters, remains to be seen. This has left them lacking specificity and differentiation and with only vague identities in the marketplace, and the lingering questions of are they, on the one hand, merely commitment-phobic or, on the other hand, a veil behind which the agro-chemical industry can hide?

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Conflict of Interest

The author declares that they do not have any conflict of interest.

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