

100 years of Biodynamic Research

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A new impulse for agriculture saw the light of day in 1924 at the headquarters of an estate in Kobierzyce, Silesia (then Germany, now Poland). Rudolf Steiner's course for farmers was at their request. It gave a deepening and broadening view of what was understood as agriculture (then and currently). Several generations of farmers and private researchers have developed these ideas into a farming system that has also been the subject of university research for many decades.

Research has been part of its development since the third day of the course. The participants founded an 'experimental circle' for this first modern form of organic farming in the world. The year before the course, anthroposophical researchers in Dornach had already trialled some of Steiner's ideas: the production of the horn manure and silica spray preparations.

Writing about science here we remind ourselves of some premises that generally apply to agriculture.

- Agriculture is a way of life, not just an industry.
- Farmers are designers and managers of changeable ecosystems on planet Earth.
- By its very nature, agriculture is multifunctional, i.e. far more than just production.
- Agriculture (in the EU) is heavily regulated today with obligatory practices and reporting.
- Research into organic farming has

received and continues to receive its main impetus from practice.

- In terms of scientific theory, agricultural research is not a natural science, but a technical, biological or chemical science also involving living things and human interventions.

It is important to know this when talking about and researching agriculture, because there are also completely different approaches, the most recognised being of global agribusiness, driven by technology, chemicals and profit, which, ultimately, only produces standardised raw materials for the corresponding stock exchanges on the world market irrespective of location. This industrialised agriculture is a reality, therefore the focus of today's agricultural research is increasingly taking less and less account of non-industrial premises.

Kobierzyce, Wroclaw was the administrative centre of early industrialised agriculture with its flat landscape, sugar beet and grain production. Steiner's lectures were simply called "Agricultural Course". It was only posthumously published as a book as "Spiritual Foundations for the Renewal of Agriculture". It was not a handbook, but rather ideas, pictures and indications for an approach mainly centred on the biodynamic preparations and indicating the interplay between soil, plants, animals and humans, not agricultural economics.

The lecture series is focused on

answering farmers' questions from a deep understanding of culture and nature rather than industry. Steiner was not a specialist scientist, but a polymath who was able to draw on his profound wealth of Western culture from Aristotle to Goethe. He had developed his own path of knowledge and read contemporary agricultural literature in preparation. In Steiner's words: 'the human being is the basis for an agriculture as "a kind of individuality" and is very much at the centre of nature'.

Research right from the start

There was plenty to research within such a broad framework, from practical measures such as the preparations and application of them, composting etc. to fundamental issues such as the organisation of a farm or the understanding and working with the forces in nature.

According to the reports from the Experimental Circle meetings appearing in the Demeter monthly magazine the topics from 1930 onwards show the breadth of development. The contents of the early years are in the form of accounts of practical research such as seed trials, cereal breeding, the effect of companion plants, medicine against foot-and-mouth disease, and study of Steiner's preparations and composting methods. The pioneers did not call this type of farming bio-dynamic until 1927.

More research focussed on the qualities of plants and products that cannot be seen or easily measured:



Ehfried Pfeiffer.



Jurgen Fritz.



Maria Thun was a pioneer in research on sowing times in connection with lunar cycles.

In the 1960s/70s a series of dissertations laid the analytical foundations for a biodynamic understanding of food quality using the criteria of shelf life, harmonious substance formation, low nitrate content, the expression of valuable ingredients, and its influence on the reproduction of livestock.

whether preparations, composts or milk. Inspired by Rudolf Steiner, around the time the course was given, Ehrenfried Pfeiffer and Lili Kolisko had begun to develop the first picture forming methods. These were intended to help describe the forces that shape plants, food or blood. Lili Kolisko's work is still the basis for ongoing research into product quality assessment.

Suggestions for breeding work were derived from Steiner's lectures. New breeding methods were sought; for example with the spike bed in cereals, according to Martin Schmidt. There were and still are attempts to cultivate wild grasses and make them usable for cultivation and human nutrition. This took place primarily on the farms of the Experimental Circle members - supplemented by the "laboratory", the Biological

Institute in Dornach at the Goetheanum School of Spiritual Science.

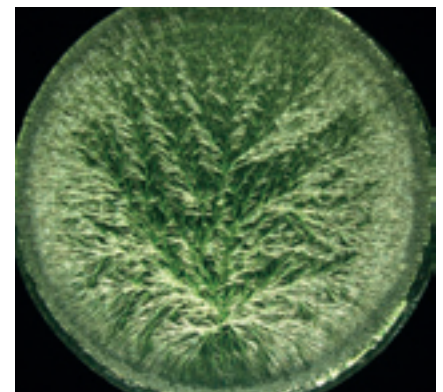
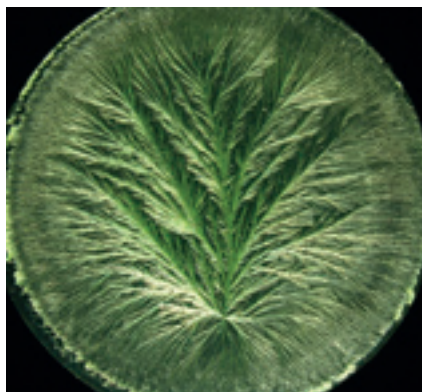
Institute research follows practical testing

After the war, the Forschungsring e.V., (formed in 1946) founded an institute in 1950 to supplement practical research with precise scientific trials. The Forschungsring still plays an important role today as a research organisation for the biodynamic movement, also networking biodynamic research into general academic research.

This increasingly scientific approach led to collaborations with the Universities of Giessen and Hohenheim and other institutions. In the 1960s/70s a series of dissertations laid the analytical foundations for a biodynamic understanding of food quality using the criteria of shelf life, harmonious substance formation, low nitrate content, the expression of valuable ingredients, and its influence on the reproduction of livestock.

A further step towards understanding was taken in 1980 with the long-term experiment at the Darmstadt Institute. Here the organic and biodynamic variants differed from the systemic comparison Demeter-Organic-Conventional of FiBL, where only the application of the of the biodynamic preparations and 'conventional' inputs were variables. These studies showed the effect of the BD preparations on soil fertility. An important outcome of this research was the improvement of farm fertilisation using biodynamic preparations, in particular the manure produced by the new loose housing systems.

The data from Maria Thun's studies on sowing times in connection with lunar rhythms were the subject of a series of dissertations at various universities. Through this Hartmut Spieß (Darmstadt) became an expert in the chronobiology of crop plants and found lunar reaction types in carrots, rye and potatoes.



Left: carrot juice fresh. Right: carrot juice aged.

The research questions revolve primarily around the systemic effects of biodynamics, the preparations, and the quality of its fertilisers and foods, primarily against an intrinsic biodynamic background, with a clear focus on plants and soil.

Research into plant health led on the one hand to biological methods and remedies against wheat blight etc, and on the other to Goethean researchers working on the foundations of a different kind of plant breeding.

The Darmstadt Institute (a research centre) carried out diverse collaborations, including biological plant protection with the Federal Biological Research Centre, Darmstadt. Practical agricultural research was carried out on composting, legume cultivation, spelt, peat substitutes, organic fertilisation, and later on mulch and soil. The laboratory in Darmstadt also acted as a quality control centre for the Demeter Association and was thus able to provide suggestions for the world's first organic processing standards.

The investigation of biodynamic preparations continued and intensified in order to gain an understanding of their effects and different qualities. The observation of the harmonizing effect on plant growth and maturity was derived from a large number of individual results.

Institutes that researched biodynamic questions had also been founded in other countries. Ehrenfried Pfeiffer's laboratory was set up on the Threefold Farm in the USA as early as 1946. The pioneer work of sensitive crystallization was researched, municipal composting developed and they taught "integrated organic science" at the University of Rutherford, New Jersey from 1957 onwards. The Nordic Research Circle was founded in 1949, with an institute in Järna, Sweden from 1965 onwards, it contributes to further development of organic farming to this day. The

Bio-Dynamic Research Institute in Australia, which now operates as a certification organisation, started in 1957. In 1976, the new Dutch Louis Bolk Institute began with medical and biodynamic questions and plant ethics; today it is mainly occupied with reports on agricultural policy. The Michael Fields Agricultural Institute in Wisconsin, USA, opened in 1984, has also developed from its initial biodynamic themes.

Parallel to these foundations, methodological research into the phenomenology of plants was carried out at the Natural Science Section of the Goetheanum, which provided important additions to the understanding of quality and approaches to biodynamic plant breeding.

New collaboration with universities

Establishing a Chair of Organic Agriculture in Bonn, the first for a German university, the possibility opened up against the trend in agricultural science to explicitly pursue biodynamic questions. Jürgen Fritz laid the scientific basis for a model of effectiveness of the biodynamic horn silica preparation, including proof of efficacy.

In 2005, an endowed professorship for biodynamic farming was created at the University of Kassel/Witzenhausen, unfortunately only for six years. However, teaching and research on biodynamic practice continues, now under the umbrella of the Chair of Organic Agriculture and Plant Production. Miriam Athmann, Jürgen Fritz, Daniel Kusche and their team are currently one of the most important research groups on biodynamic agriculture and food production worldwide.

Does biodynamics affect nutritional value and food quality?

The second key question that led to the Agricultural Course is also being addressed. Quality is determined by analysing nutritive ingredients, usually supplemented by picture forming methods, along with tests for vitality and shelf life; as in the cucumber slice test.

Using empathic food tasting clues to the psychological effects of food can be obtained. In studies with breastfeeding mothers and with nuns the effects of consuming biodynamically produced milk

or approaches to a diet with biodynamic foods have been shown. When it comes to wine, quality can be tasted by experts - but this is hardly reflected in the studies.

Research methodology

Limited resources are the key factors affecting methodology as this research is primarily privately funded. The information outlined by Steiner and the resulting questions are so broad that only diversity in hypotheses and methods can lead us further. In terms of content, the research questions revolve primarily around the systemic effects of biodynamics, the preparations, and the quality of its fertilisers and foods, primarily against an intrinsic biodynamic background, with a clear focus on plants and soil. There is much still to be done.

In the experimental methodology the instruments of research most commonly used in agricultural research are represented: surveys and case studies, practical tests, field tests, vessel tests, laboratory tests, and even nutritional studies.

The usual experimental setting was expanded by biodynamicists to include "on farm" and "in-farm" research. The farm as an experimental farm, a place of research and development was there from 1924. Forschungsring are currently working with other organic associations to further develop practical research on an equal footing with farmers. Goetheanistic-phenomenological methods also describe changes, whether on the area or in plant and soil phenomena.

How and what is measured? There are a variety of criteria and parameters including new methods: classic parameters such as yield, constituents, assessment of disease infestation, soil analyses, including microbiological analyses, etc. are complemented by methods that focus on the physical-etheric quality of the food. For example, storage tests, decomposition or stress tests, microbiological screenings, stimulated fluorescence, etc. Effects on life forces are recorded using image-creating methods such as copper crystallization or rising picture or perception of forces images. With a view to the psychological effects of food, sensory effects were scientifically researched and developed. The latest



DOK trial plots in Switzerland.

measurement techniques such as photosynthetic performance were also used in the investigation of the effects of electromagnetic pulsed radiation on plants.

Who are the biodynamic researchers?

At the beginning it was Steiner, Pfeiffer, Wachsmuth with the first test for the production of the horn manure preparation in the garden of the Goetheanum, then the members of the Experimental Circle on their farms, dedicated gardeners, breeders, practical researchers, with from the beginning both men and women.

The centre in Germany was the experimental/research circle (Forschungsring) and there have always been individual researchers, “One-man or one-woman institutes”, rarely linked with universities or other research locations. From a handful of such research initiatives the biodynamic cereal breeding companies have developed, initially linked by annual Experimental Circle trials. The plant’s ability to actively mobilize nutrients was also discovered by an independent researcher.

The Research Institute for Organic Agriculture (FiBL) in Switzerland, co-founded by Demeter farmers, has become an authority in European organic farming. The long-term DOK trial demonstrated differences, questions of quality and animal breeding and animal health and soil quality from a biodynamic perspective.

University research on the specifically biodynamic only takes place where people interested in biodynamic methods can use the local opportunities to do so. In Germany, this is only the case in individual universities. However, there is intensive collaboration between these working groups and the biodynamic movement, which is professionally supported by the research coordination of the Biodynamic Federation and Forschungsring. Biodynamic themes and questions are currently being incorporated into a number of national and international research projects. In 2020, over 90 biodynamic farms were directly involved in practical research projects, involving 1,800 agricultural practitioners. Practical research is not limited to biodynamic farms, it is also part of the organic agriculture and food industry, the Demeter movement shares many questions with other organic companies. In order to focus forces the German Demeter Association works closely and successfully with the Bioland and Naturland associations in the Association for Practical Ecological Research.

In the 2000s, interest in biodynamic farming became international, as did the research landscape. In particular, researchers in several South American countries, India, Italy and Eastern Europe addressed biodynamic issues. Overall, there is growing interest in a research-based approach to biodynamics. This is reflected in a sharp increase in scientific

publications. The reason is not only the globally-growing biodynamic movement, but also the curiosity about scientific perspectives on biodynamic phenomena and interest in development of research methods.

At the 2023 Agricultural Conference in Dornach, the Forschungsring, BFDI, and the Section for Agriculture at the Goetheanum founded an international platform that connects researchers in biodynamic agriculture and food production worldwide.

Finally, it should be noted that the vast majority of biodynamic research has been and still is financed by private business and donors. For 100 years!

Conclusion – looking back, what can we say about today’s biodynamic research?

Solid knowledge, even in biodynamics, is not possible without directed, joint and long-term research efforts. And, because increasingly only peer-reviewed publications are taken seriously, university/academic involvement is needed.

Firstly, we need people who do proactive research and who pursue an idea with perseverance.

Secondly, today you can no longer conduct research alone: you need collegial discussion - if only as a resonance space - and several perspectives to be able to classify results. NB. The pioneers of picture forming methods were lone fighters for many decades. Only when work on it was developed in several places at the same time could the systemic principles be clarified and the advances in methodology

and understanding published internationally in a scientifically relevant manner - the breakthrough.

Thirdly, sometimes you have to wait for new, finer analytical or statistical methods to materialise. The effect of biodynamic practice on vineyard soils could only recently be described and confirmed through new methods of microbiome analysis.

And fourthly, the plurality of approaches and criteria are increasingly relevant, as is the view of external disciplines beyond the purely agricultural and scientific perspective: e.g. the use of medical equipment to examine earthworm tubes, or using a philosophical-ethnological point of view when looking at the spiritual background of biodynamics has expanded the space for knowledge and understanding. The social science perspective on the goals and design of biodynamic agriculture as a business also deserves more application.

These are reasons for founding the international Biodynamic Research Platform in February 2023. This follows two international conferences on biodynamic research in 2018 and 2021, and after research lectures had been held in Germany (Kassel-Witzenhausen 2000/1 and 2007/8) and a scientific



The launch of the Biodynamic Research Platform in February 2023.

conference (Bonn 2014) took a look at biodynamic knowledge.

The Forschungsring's platform and regular newsletter (English version available) are aimed at the increasingly international community of researchers at universities and consulting organisations, whether in the UK, India, Italy or China. In addition to the effects of the preparations or the biodynamic system on yields and qualities, the examination of the horn preparations themselves

is also a focus here. The findings and collaborations give hope that the potential of biodynamics as a farming system can be better recognized, communicated and the practiced widened.

This is a translated and edited version of an article that originally appeared in December 2023 in the German biodynamic Journal, *Lebendige Erde*. See www.lebendigeerde.de/index.php?id=pdf_236 or lebendigeerde.de/index.php?id=pdf_236. It has not been reviewed by the author.

Biodynamic Research update

RICHARD SWANN

The Biodynamic Research Day at The Goetheanum on the 6th February this year was rich in content with several researchers presenting their work. Jurgen Fritz from the University of Kassel in Germany presented the groundbreaking work that he has been involved with 'The Biodynamic Preparations and the plant growth-promoting microorganisms'. Using several research locations in France it indicated that biodynamic preparations can be shown to increase the soil microbiome. This has since been published as a paper at <https://academic.oup.com/ismecommun/article/4/1/ycae021/7601005>. It will be covered in more detail in the next issue of *Star and Furrow*.

Others included former BDA chair; Julia Wright who presented

her work based on anthropology. Cyrille Rigolot from France spoke about a transdisciplinary approach to biodynamics and Kwalis Institute in Germany gave an outline of a new project to investigate the effects of plant breeding on fruit quality at the hand of several analytical and holistic methods.

A map has also been started showing the research projects across the world (<https://www.sektion-landwirtschaft.org/en/research/projects>). Anyone involved with biodynamic research is invited to be added to it.

Several online seminars are being arranged for the coming year to which contributions are welcome. Further details can be obtained from Maria Paz Bernaschina at paz.bernaschina@demeter.net or Christopher Brock

at brock@forschungsring.de.

Meanwhile, the Research Communication Group has finalised two booklets on biodynamic agriculture. One is entitled 'Facts about Biodynamic Agriculture' and the other 'Biodynamic Horn Manure' These are available in four languages and can be downloaded at <https://www.sektion-landwirtschaft.org/en/research/basics>.

Next year will be a big year for us in the UK as we will be hosting the third International Biodynamic Research Conference. It is hoped that this will attract around two hundred participants from across the world. This is planned for September 2025 with a potential venue being currently explored. More details will appear in the BDA newsletter and the next issue of *Star and Furrow*.