Biodynamic Agriculture

A model for sustainable agriculture of the future?

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Biodynamic agriculture began in 1924 on an estate near Koberwitz near Breslau, where Rudolf Steiner gave eight lectures on sustainable agriculture. This is based on the values of anthroposophy, puts people at the center through their perception and knowledge, whereby ethics and aesthetics become part of actions.

Demeter is now represented globally as an association and brand, according to whose guidelines around 8,000 farmers cultivate biodynamically on a total of 160,000 hectares worldwide (Demeter 2016), which accounts for less than half a percent of the total organic area. After 90 years of existence, biodynamic cultivation still receives little attention in the scientific world. On the one hand, this can be explained by the anthroposophical approach of subjectivity, whereby every action is viewed individually and is partly in contrast to factual, objective science. On the other hand, existing scientific comparative studies show inconsistent results, where no significant differences can often be determined, especially in comparison to organic farming.

For the scientific basis of biodynamics Agriculture was played by Lili Kolisko plays a central role through its rhythmization and potentiation processes. In 1923 she developed the rising image method and studied the influence of cosmic constellations on the creative forces. Together with her husband Eugen Kolisko, “Agriculture of the Future” was published, which was translated into German in 1953. Despite her tireless commitment to researching the effects of preparations on plant and animal growth, Lili Ko-lisko embodies a tragic figure, as her life's work was not recognized until her death and is still controversial today (Anthrowiki 2016) .

In 1962, Kuhn addressed the question of how paradigm shifts occur in science (Kuhn 1970). Science usually explains “anomalies” with the conviction that they can be explained at a later point in time within the existing thought structures. However, a few scientists take such inexplicable “anomalies”, ask different questions and try to explain them with a different scientific theory. Specialized journals, scientific societies and, over time, training opportunities appear in which a new, more coherent paradigm is developed. The discussion between the 'old' and 'new' paradigm is unsatisfactory because common me standards for comparison are missing. Textbooks are being written about the new paradigm, the new ideas are becoming more popular, more scientists are working on them, and the scientific evidence is increasing. The new paradigm eventually becomes normal science and replaces the old paradigm. Wynen applied Kuhn's theory to the history of organic farming and saw striking parallels (Wynen 1996). However, while organic farming, originally referred to as organic farming, has already largely been incorporated into normal science, biodynamic farming is only just beginning. Nevertheless, important elements of this “new paradigm” have already entered the scientific world.

That's what this post is supposed to be about.

How sustainable is biodynamic farming?

Numerous individual studies and meta-analyses prove the ecological excellence of organic farming (Stolze et al. 2000, Mäder et al. 2002, Hole et al. 2003, Gattinger et al. 2012; Niggli 2014, Skinner et al. 2014; Tuck et al., 2014). The social and economic excellence is only partially proven (Niggli et al. 2008), although the economic viability of organic farming in Europe is heavily influenced by state subsidies.

measures are influenced. In the numerous studies on the ecological, social and economic sustainability of organic farming (in 2000, according to Stolze et al., there were already more than 400 studies, today there are probably twice as many) there is hardly any distinction between ecological and biological dynamic agriculture because their number is too small.

Scientific studies that specifically deal with aspects of the sustainability of biodynamic agriculture include the following:

• Mäder et al. (2002) showed an excellent input-output balance in organic farming in the DOK long-term system trials, whereby the biodynamic method did not differ from the organic-biological method. Compared to integrated production, the organic processes had an 83% yield over 21 years, but required 96% fewer pesticide active ingredients and the input of nutrients was between 30 and 64 at NPK.

• Turinek et al. (2009) summarized the results of 30 refereed publications as follows: The biodynamic preparations influence soil quality, biodiversity, energy use efficiency and landscape quality.

• Carpenter-Boggs et al. (1999) found hardly any differences in soil biology between biodynamic and organic farming. However, the use of preparations resulted in measurable but only short-term changes in the mineralization of carbon and in the fatty acid patterns of the soil microorganisms.

• Zaller and Köpke (2003) were able to show that with biodynamically prepared, composted Cow manure accelerated the breakdown of organic material in the soil and increased earthworm populations.

• Mäder et al. (2002) were able to show that some soil biological and chemical properties differ greatly between biodynamic and organic cultivation were.

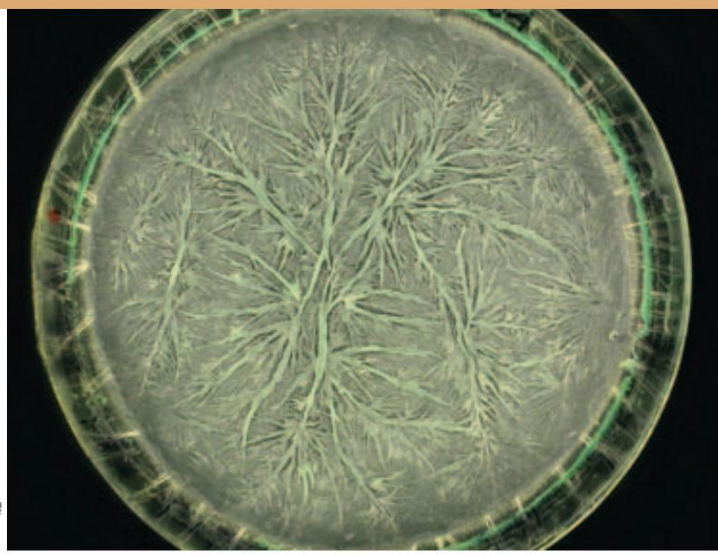
• Fliessbach et al. (2007) showed that the highest values for soil biomass were found in the biodynamic plots of the DOK trial (trial duration 21 years). In addition, there was a high positive correlation between biomass and aggregate stability in the biodynamically managed soils.

• Various authors such as Berner et al. (2008), Krauss et al. (2010) and Gadermaier et al. (2011) showed that the effect of reduced tillage compared to plowing on the proportion of humus in the topsoil, on the number and mass of earthworms and on microbial soil activity masked the effect of the biodynamic preparations.

• Forster et al. (2013) showed comparable cotton yields in the Indian tropics using organic, biodynamic and conventional production. The effects on soil fertility will be published soon.

What impulses does biodynamics have? Economics of the Organic farming research or agricultural sciences in general?

Biodynamic agriculture has left a clear mark on organic farming research.



Biodynamic innovation in quality assessment: Image-creating methods: Barley crystallization image

let. The concept of holism was only rudimentarily present in organic-biological agriculture, as developed by Müller and Rusch, Balfour and Howard or Boucher and Lemaire in Europe. Howard speaks of the “rapidly growing evidence that fertile soil means healthy plants, healthy animals and ultimately healthy people” (Howard 1943).

But it was only the idea that a farm was an organism that extended the holistic approach to its socio-economic, organizational and landscape dimensions.

However, the concept of the farm organism is a challenge in objective and verifiable science. Nikolai Fuchs summarizes this as follows: “But these often show system results, which means you cannot deduce exactly which individual aspect the effect found is based on. In living things one is not dealing with simple, mono-causal cause-and-effect relationships; You quickly run the risk of being 'unscientific'. But that says more about the respective scientific concept than about the object of investigation” (Fuchs 2006). Steiner has developed preparations to promote the function and exchange of organs. The

The preparations as a vehicle to combine a complex concept with agricultural practice connect.

Preparations were essentially a vehicle for combining a highly complex intellectual concept with an agricultural practice.

An important cornerstone of biodynamic culture is the observation of the individual kingdoms (animal kingdom, plant kingdom, etc.), careful reflection and a deep willingness to adopt and adapt ethically compliant patterns from nature. Biodynamic farming has had a strong and positive influence on organic farming culturally and ethically, but not on science itself. For example, while the origins of species-appropriate animal husbandry in ecological research were strongly focused on animal ethology, which considered the behavior of wild animals in their natural habitats as well as the behavior of farm animals under the conditions of different husbandry systems, the biologically expanded -dynamic farms the concept of animal welfare through the animal-human relationship. This gave rise to completely new questions, which, for example, aimed to reduce the animals' stress (Probst 2014).

In the breeding of dairy cows, which are biodynamic Agriculture through the use of individual organs for production

While the preparations are of particular importance, great emphasis is now placed on longevity, robustness, efficient utilization of roughage or the ability to quickly adapt to changing environmental and management conditions (e.g . feed quality). Here too, the influences of biodynamic agriculture on general research are noticeable. Bio-dynamic agriculture has had a strong influence on the discussion about the dehorning of cows, which criticizes the unaesthetic interference with the animal's nature. In response to this impulse, FiBL offers recommendations for adapted stable facilities for horned cows (FiBL 2016). From the behavioral observation of nature combined with high-tech devices such as “Rumi-watch” (Zehnder et al. 2012), which uses sensors to collect data on rumination, drinking and eating activity as well as the movements of cows on their land health status, an attempt was made to improve the breeding selection for roughage cows.

In addition to its influence in the animal sector, biodynamic agriculture took on plant breeding early on.
An independent seed supply should ensure optimal adaptation of the plants to the specific site conditions and the cultivation techniques of bio-dynamic agriculture (Hurter 2014).
Biodynamic breeding is based entirely on the concept of farmer participation, as developed at ICRISAT (Ceccarelli 2012).

When it comes to food quality, numerous suggestions also come from the biodynamic sciences. The image-creating methods significantly expanded the understanding of quality compared to analytical methods. Terms like vital quality (Balzer-Graf 2016) were completely new 25 years ago. There are now not only numerous results available, but also successful attempts have been made to correlate the image-creating methods with analytical methods (Weibel et al. 2014) and the evaluation of the images, which requires a great deal of individual experience , to automate and supplement with digital image evaluation (Kahl et al. 20

In biodynamic agriculture, the success of a farm is based on people and not on technology. This important finding is now confirmed as generally valid by numerous research results.

Small farmers, for example, produce the majority of food; 84% of all farmers in Brazil cultivate 24% of the land (GRAIN 2014). In Kenya, agricultural yields would double if the cultivated by small farmers (GRAIN 2014). Numerous case studies in sub-Saharan Africa have also shown that subsistence farmers can achieve sustainable intensification and increase yields thanks to organic farming

can achieve 100% (Hine et al. 2008). The challenge lies in defending the land rights of small farmers and promoting cooperation. But exactly the opposite happens. Although the area under cultivation is constantly increasing, small farmers own ever smaller areas (mostly less than 2 hectares) and are slipping into poverty (GRAIN 2014).

What can biodynamic farming contribute to the future of agriculture and nutrition?

The World Agricultural Report of 2008 clearly showed that ecological, regional, multifunctional and experience-based agriculture can best meet the challenges of the future (IAASTD 2008). New approaches to agricultural research are also needed. Securing the entire spectrum of ecosystem Performance is the focus. Small farmers and especially women play a crucial role in fighting poverty and ensuring food security. New economic forms of agriculture such as solidarity farming or community initiatives in urban areas significantly stabilize food security. As the various examples in my article have shown, organic farming has all the properties and elements that will be essential in the future. I

Location adapted with the Goal of cultivation and nutritional quality: breeding biodynamic grain varieties

literature

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