HEALTHY FARMS, HEALTHY SOILS, HEALTHY FOOD: ESTABLISHING A FOOD QUALITY RESEARCH NETWORK IN NORTH AMERICA

A Concept Paper developed by the Research Steering Team of
the Biodynamic Farming and Gardening Association with
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I. Overview

The biodynamic approach to agriculture is based on the idea that there is an intimate relationship between healthy soil, healthy farms and healthy food. This notion is shared in many circles of the wider organic and sustainable agriculture movement as well.

But what makes an item of food, for instance, healthy or high quality? Neither the absence of toxins (e.g., "pesticide free") nor certain nutrient groups ("fat free") can be a sufficient criterion. The presence of specific nutrients ("high in Vitamin C"), many nutrients ("nutrient dense"), or proportions of nutrients ("high omega-3/omega-6 ratio") may be more indicative of genetically heritable factors than indicators of the health and integrity of the crop or food product. Nutrient analysis can only be a useful criterion if one charts the quantities of substances relative to the developmental status of the organism, i.e., its vitality, health, maturity, ripeness, decay. Thus, making sense of quantitative analyses of substances presupposes the ability to directly or indirectly assess the status of development, health, and vitality of the plant or animal and its products as a whole. Such assessments of 'life status' are inherently qualitative as life is not a substance that can be quantitatively measured.

On the conceptual side, integrative ideas have been developed by the biodynamic community describing health or quality as a dynamic balance between variously defined extremes such as 'growth and differentiation.'[1] Insights such as this offer the potential to integrate a host of quantitative data into a larger, more dynamic understanding of the factors that contribute to genuine food quality.

On the practical side, over the last 80 years biodynamic researchers have pioneered a host of quantitative and qualitative methods to assess the overall health and integrity of soils, plants, animals and food products. The quantitative methods have included measuring crop plant constituents such as nitrate and vitamin C, amino acid content, etc. On the other hand, qualitative methods measuring life status or vitality in crop products have often entailed measuring the product's resistance to decay and death. These qualitative methods include measuring electrical conductivity, bioluminescence, as well as holistic 'picture-forming' methods such as copper chloride, sensitive crystallization, and various methods of paper chromatography. With the picture-forming methods, extracts of soil, plant and animal products are tested for their ability to interact with and form metal salts into discrete forms or 'pictures'. The ability to make more structured pictures increases with product quality and with physiological ripeness.

[1] See, for example, J. Bloksma et al. 2007, "A New Quality Concept Based on Life Processes" (www.louisbolk.org/downloads/1910.pdf), or W. Schad, 1998, "Health and Sickness in Medicine and Ecology" (www.anthromed.org/Article.aspx?artpk=45).

These methods have been applied in many countries to a wide variety of crops ranging from vegetables to wine, from grains to dairy products. Long-term field trials, coupled with these evaluation methods, have shown that organic and biodynamic practices enhance the overall vitality and integrity of soils and food products while conventional practices decrease it.[2] The methods continue to be researched and developed in Europe.

Aside from the benefits of pure research to advance our understanding of health, the aforementioned methods can also be applied practically to help both farmers and consumers assess soil and food crop quality. In the 1950s and 1960s, for example, the Biochemical Research Lab in New York, under the direction of Ehrenfried Pfeiffer, applied some of these methods for cooperating farmers and consumers. From the 1960s to the 1990s this kind of work was carried out at a higher level by the Scandinavian Research Circle (Nordisk Forskningsring) under the leadership of Bo Pettersson. The Circle tested wheat, rye, potatoes, and carrots from a network of cooperating biodynamic farmers in four countries (Sweden, Norway, Denmark, and Finland). Each year a report was given to each farmer of the quality of their products and how well they did relative to the other biodynamic farmers. This information was also used by the certification organization (Demeter) to monitor quality and to inform customers of their efforts to constantly upgrade their products.

We believe the kind of approach taken by the Scandinavian Research Circle is needed in North America to advance our culture's understanding of quality, to help farmers upgrade their methods, and to ensure that consumers obtain high quality products. We propose to couple this method with a strong participatory component in which the insights, sensory observations and perspectives of farmers are fully integrated into a holistic research and development process.

II. Narrative Description of the Project

Because of the originality of the concept, we thought it would be helpful to include a brief narrative description of what a Food Quality Research Network like this might look like on the ground.

The Food Quality Research Network would consist of farmers, researchers and cooperating laboratories. The researchers and labs would function as a single North American network, while the participating farmers would be organized into regional working groups. The farmers would ideally be employing a diversity of agricultural methods and soil fertility techniques, from conventional to organic to biodynamic, etc. but would all share a desire to better understand and improve the quality of their products and soils by participating in the Network. We anticipate that one or more research stations would also participate which will allow for certain questions to be addressed through a more traditional experimental design process.

Each regional working group would likely focus on one product for a number of years, for example, carrots. Each year in the fall, the members of the working group would bring samples of their carrots, as well as soil samples, to a day-long meeting in the region, organized by the researchers who are leading the project. The producers would bring to the meeting not only their carrots and soil samples, but also detailed notes on their growing methods, planting and harvest dates, weather conditions, plant

[2] See Kjellenberg, L. and A. Granstedt. 2005, "The results from the K-trial: A 33-year study on the effect of fertilization on the properties of soil and crop (http://orgprints.org/10765/1/K-trial.pdf) and Granstedt and Kjellenberg 2011, "Skilleby Long-term field trial 1991-2010" (www.jdb.se/sbfi/files/Skilleby_long%20term_field_trial_1991_2010.pdf).

observations, etc. A training session earlier in the year would have prepared them for how to gather this information and collect the samples, as well as which varieties to grow, etc. Producers who cannot attend or choose to opt out of these meetings would agree to send their samples and notes ahead of time.

At the meeting, a host of sensory exercises are led by different researchers through which the farmers are given the opportunity to develop, share and refine their own sense of the health and quality of the carrot and soil samples. For example, structured exercises would be conducted to gather careful observations of the form and texture of the carrots and soil samples. In addition, a carrot tasting panel would be assembled together with other ad hoc observations of the products and the growing season. Detailed notes would be kept from these sessions.

Prior to this session, samples of these same products and soils would also have been sent out to the network of laboratories participating in the project. The labs would conduct detailed quantitative and qualitative analysis with a variety of methods, in order to look at the quality of products from many perspectives. Each lab would have a different area of expertise and provide different testing methods. Quantitative methods might include Brix testing, soil microbiology testing and chemical analysis of phytonutrients and other crop and soil constituents. Qualitative methods might include root health studies, studies of keeping quality (rate of decay), animal feeding trials, tasting panels and picture forming methods (e.g. sensitive crystallization and paper chromatography). A team of lead researchers would coordinate the distribution of samples and compilation of results from the various labs in the network.

The lead researchers would gather the results of all the tests, including the observations gathered at the farmers' meeting described above, and work to formulate an understanding of the relative health, quality and vitality of the products and soil samples and the on-farm factors that may have contributed to these results. The researchers would then draft a detailed report to bring to another meeting with the farmers for in-depth sharing and discussion.

Through this effort, the farmers could recognize, objectively, which are the highest quality carrots and soils, how this was determined and what were the factors contributing to it. These discussions would in turn lay the groundwork for another year of research, in which each farm could identify and choose to make certain changes in their production practices, etc. in an effort to enhance the quality of their soils and products.

To begin with, we believe the Network could be piloted in one region with other regional working groups of farmers added over time. Farmer meetings could also take place in conjunction with regional agricultural conferences rather than as stand-alone events to make it easier for farmers to participate, thus reaching a wider audience and new collaborators. In addition, not all the farmers in the working group would be required to participate in the day long meetings. They could simply participate in the training session and then opt to get written reports on the quality of their products and soils.

III. Benefits

The benefits of a Network like this would be numerous:

1. The products and farming practices in a given region are being steadily improved through an objective, participatory process that transcends labels like 'organic,' 'conventional' or

'biodynamic,' which can sometimes divide farmers. The goal of this effort is not to prove any one system better or worse, but simply to determine on an objective basis what contributes to the health and quality of food and soils. What is learned by the farmers participating in the Network can then be readily shared with other farmers through various kinds of publications and events.

2. Farmers are being trained to be more careful and in-depth observers of their farms, products and soils and to make better direct assessments of health and quality. They are also coming into a cooperative relationship with a group of other farmers and researchers who can help them evaluate, enhance and refine the management of their farms and the health and quality of the products they are producing. A collaborative learning community is being formed with untold benefits to the participants, their local communities and the eventual consumers of the farm products.

3. Not only are products and soils being tested through this project, however, but also the prevailing theories and hypothesis regarding quality and health. By bringing a diverse group of researchers and labs together, and correlating the results of different methods, together with the farmer observations, a foundation is being created for a much richer understanding of the nature of food and soil quality—and the factors and practices that contribute to it. This approach is likely to generate far-reaching, synthetic insights into the nature of quality.

4. After a number of years, the results of this project should also be highly applicable for consumer education. Imagine, for example, being able to teach consumers about three key indicators of the quality of carrots, eggs, apples or wheat that they can assess with their own senses or through simple tests they can conduct at home. We believe it is extremely important for the future of a healthy food system to teach consumers how to assess food quality directly, in conjunction with what they can learn from ingredient labels or various certification schemes.

5. Finally, we believe that a network of labs of the kinds described above could sustain itself over time through work with farmers and other research institutions on a fee-for-service basis.

IV. Next Steps

As pointed out above, the purpose of this project is not to focus on researching biodynamic farming practices, per se, but rather to make use of biodynamic insights and testing methods, together with a host of others perspectives and approaches, to enhance our understanding of quality soil and food and what contributes to it. Therefore, at this time, the Biodynamic Association is seeking to engage a wide range of potential partners, advisers, and funders in dialogue around this concept. On the basis of these dialogues, we anticipate this concept will be significantly enhanced and that a more detailed plan for the project along with specific funding proposals will be developed.