

2 Dutch research on organic agriculture: approaches and characteristics

Dutch research on organic agriculture began in the late 1970s. Key characteristics of this research were the systems approach and the strong participation of farmers and stakeholders. The ambitions for a fully sustainable organic agriculture as formulated by the Dutch organic sector set the research agenda.

A short history

Dutch research on organic agriculture began in the late 1970s with the establishment of a national experimental farm to evaluate the potential of organic agricultural systems (the DFS in Nagele). During the same period, the Louis Bolk Institute in Driebergen (see Box) established a department for organic agriculture. Both initiatives were in response to the growing interest in organic agriculture as an alternative to conventional farming.

On the 72-hectare experimental farm 'Development of Farming Systems' (DFS), three farming systems – on a semi-commercial scale – were developed, implemented and compared from 1977 until 2002. The three systems were a bio-dynamic mixed system, an integrated system and a conventional arable farming system.

In the 1980s, virtually the only government-sponsored research on organic agriculture in the Netherlands took place on the DFS farm. In the 1990s, however, research on organic and integrated farming systems expanded into other regions and other sectors, such as nursery trees, vegetables, flower bulbs, fruit and dairy farming. Almost simultaneously, the interest in more thematic or disciplinary research into aspects of organic farming increased. These types of research were mostly carried out in the context of systems research or in cooperation with commercial farms. The Louis Bolk Institute expanded its work on organic farming, mainly in close cooperation with commercial farms, based on a participatory research approach.

At the end of the 1990s, national pilot farm networks were established in arable farming, vegetable farming and dairy farming. In these networks, commercial farms worked closely with advisors and researchers on the development of their farming systems. These efforts led to networks in other sectors, such as nursery trees, fruit, flower bulbs, poultry and pigs. Since that time, the network approach has become a much appreciated key element in Dutch research and development for organic agriculture.

Clustering research for organic agriculture

Since 2004, all public-funded research activities for organic agriculture in the Netherlands have been brought together in the so-called 'Cluster Organic Agriculture'. In this cluster, partners such as Wageningen UR and the Louis Bolk Institute work together on different research themes.

This makes the most efficient use of all available manpower and research facilities. This cooperative approach also brings together specialists in integrated research, even if they work for different organisations.

The agricultural-horticultural activities that characterise the Netherlands are very diversified and cover the entire spectrum of plant and animal production, including glasshouse production of flowers and vegetables, the production of seed and propagation materials (flower bulbs, seed

potatoes, seeds, etc) and a whole range of nursery products. Dutch research on organic farming addresses all these primary production areas. It also addresses questions and issues related to the chain, from farm to consumer. Thematic areas for research are defined in consultation with the organic sector.

At present, the cluster comprises research programmes in the following areas:

- Organic animal production
- Organic plant production (outdoors): arable crops, vegetables, fruit, wine, flower bulbs and nursery trees
- Organic greenhouse production: vegetables and cut flowers
- Aquaculture
- Robust organic propagation material and organic breeding
- Market and production chains
- Energy, climate and carbon sequestration

- Soil fertility
- Nature/landscape and multifunctional agriculture
- Policy-related issues

The cluster coordinates the research and facilitates, initiates and fosters activities relevant to all themes. These activities include documentation and communication, scientific publications, international network participation and development, and cooperation with the conventional sectors. The communication is coordinated and supported centrally. One of the strengths of the cluster is its central website, which gives access to all research results from the cluster (www.biokennis.nl)

Wageningen UR

'To explore the potential of nature, to improve the quality of life'. This is the mission of Wageningen University and Research Centre (Wageningen UR). Wageningen UR has 6,300 employees and 10,000 students from more than 100 countries. Wageningen UR specialises in the field of 'healthy food and living environment' and works around the globe doing research for government agencies and the private sector.

The domain of 'healthy food and living environment' comprises three related core areas:

- **Food and food production**
This concerns sustainable agriculture/horticulture and fisheries/aquaculture, international food chains and networks, health aspects of food and the use of biomass within the scope of a bio-based economy.
- **Living environment**
This includes nature, landscape, land usage, adaptation to climate change, water and ocean management, and the various competing claims on space,

along with biodiversity and the sustainability of management and production.

- **Health, lifestyle and livelihood**
This has to do with the influence of people's behavioural choices regarding health, food and living environment, including the behaviour of consumers and citizens, their attitudes towards risk and uncertainty, their perception of quality and safety, and the relationship between food safety and poverty, particularly in developing countries.

Issues within this domain are almost never exclusively natural, technical or social in nature. There are always multiple approaches and possible solutions, often synergetic ones. Wageningen UR therefore fosters the unique interaction between the natural and social sciences. When formulating the research agenda, Wageningen UR cooperates closely with public authorities, the private sector, special interest groups, citizens and other universities and research institutes in the Netherlands and abroad.

Beginning in 2000, public-funded research was organised in a limited number of coherent programmes that were later combined to create what is now called the 'Cluster Organic Agriculture' (see Box). At the same time, the organic sector became structurally involved in governing the research of the cluster (see Chapter 3). The Louis Bolk Institute (see Box) and Wageningen University and Research Centre (see Box) work closely together within the framework of the cluster.



Louis Bolk Institute

The Louis Bolk Institute is a private organisation which offers research, advice and development in the field of organic and sustainable agriculture, nutrition and health care. It operates as a not-for-profit foundation, and derives all its income from contract research, project subsidies and donations. The Institute links social issues with pioneering research, and bridges the gap between scientific objectivity and personal involvement. **Its strength lies in bringing different disciplines together, as exemplified by its broad range of researchers, including soil, plant and animal scientists as well as physicians.**

Research at the Institute follows a participatory approach that is both practical and holistic. Experiential knowledge is used, and questions are considered within a wider context. The Institute collaborates with practitioners in the field, as well as with many institutes and universities at home and abroad. By considering social, economic and environmental factors, the Louis Bolk Institute contributes to a healthier future for soils, plants, animals and people. **The Institute operates in the Netherlands, Europe, Africa and the Middle East. Its headquarters are in the Netherlands.**

The Louis Bolk Institute is the natural source of knowledge for encouraging scientific research and providing new insight into organic and sustainable agriculture, nutrition and health care. Its researchers have been pioneers in this area since 1976. In December 2008, the advisory organisation Agro Eco became part of the Institute. By combining research and advice, the new Institute not only provides research, but also directs new knowledge towards practical solutions and applications.

The value of 'naturalness' in organic agriculture

Producers, traders and consumers of organic food regularly use the concept of 'natural' to characterise organic agriculture or organic food. Critics sometimes argue that this concept lacks any rational scientific basis and only refers to sentiment. The Louis Bolk Institute carried out research in 2001 to better understand the content and use of the concepts of 'nature' and 'natural' in organic agriculture. This research aimed to reconstruct the value basis underlying the use of the concept of 'natural' in organic agriculture and to understand the implications for agricultural practice and policy. A literature study and the authors' own experiences were used to produce a discussion document with concrete statements about the meaning of 'natural' in different areas of organic agriculture. These statements were validated by means of qualitative interviews with stakeholders. The concepts of nature or natural appear to be value-laden. The value basis is a normative reconstruction that cannot be derived only from the use of the word 'natural' by organic stakeholders. For this reconstructed concept, the term 'naturalness' is used. Naturalness thus becomes an ethical value for organic agriculture, an inspirational guide for organic stake-

Developing organic farming: concepts, visions and system approaches

Dutch research has always been led more by the intentions and values of the organic sector than by formal rules, such as certification guidelines and government regulations. Organic farming has always been regarded as 'agriculture in development'. Striving to develop the full potential of the sector is a goal that Dutch organic farming research has set for itself.

The International Federation of Organic Agricultural Movements (IFOAM) formulated four leading principles to inspire the organic movement: health, ecology, care and fairness. These principles guide the IFOAM's development of positions, programmes and standards. In the Netherlands, a somewhat different set of concepts characterises the ambitions of organic agriculture: sustainability; environmentally-friendly; animal welfare; products that are natural, healthy and safe, and the connections to society, consumers and citizens. The concept of naturalness was studied in depth and made operational in a study commissioned by the Louis Bolk Institute (see Box and Chapter 6 for an example from plant breeding).

A second defining characteristic of Dutch organic farming research is the system approach (see also Chapter 4). This approach reflects the awareness that farm performance depends strongly on the interactions and interdependencies of various farming methods and various aspects of these methods. To fulfil multiple objectives in different domains, such as the environment, ecology and the economy, an integral approach towards the whole farming system is needed. The different methods have to be carefully geared to each other and the interactions optimised.

The Dutch research approach has always had an eye for designing, testing and improving farming

systems. Simultaneous attention is given to the development of concepts and visions, as well as to the concrete development of feasible and effective strategies, methods and techniques. For crop rotation, for instance, the basic strategy including its practical implications, potential and challenges, was described and documented by Wijnands (1999).

The ambitions of the Dutch organic sector do not stop at the farm gate. Aspects such as climate change, biodiversity, nature, landscape and sustainable food production clearly transcend the farm's boundaries. Research therefore focuses on various system levels and on the entire food chain. Examples include the cooperation between various regional farms regarding the exchange of feed and manure, and the total food-chain approach for a better performance on fossil energy use and greenhouse gas emissions (see Chapter 4).

Participatory research, on-farm research and networks

A third essential element in the Dutch research approach is its strong cooperation with farmers. There are several reasons for this cooperation. The first is that farmers (especially the pioneers in organic farming) are considered important experts in this new farming approach. Their tacit knowledge is considered to be equally important as more formal knowledge. Tacit knowledge (in dealing with natural processes) comprises the farmer's complete set of practical experiences with the complex and local organic farming system. The confrontation between tacit and formal knowledge often leads to valuable new insights. A second reason is that private commercial farms provide excellent opportunities for on-farm experimental research.

holders. The value of naturalness refers to basic respect for the intrinsic value of nature, meaning the value of nature is independent of the benefits it may provide for humans. This manifests itself in three ways: (1) the use of natural substances, (2) respecting the self-regulation of living organisms and ecosystems, and (3) respecting the characteristic and species-specific nature of living organisms. If organic stakeholders limit themselves to using natural substances, this is called the no-chemicals approach. If they also respect the self-organisation of living organisms, the authors call this the agro-ecological approach. If the normative element of naturalness is also included, this is called the integrity approach. Only when all three approaches are included can the full strength of organic agriculture manifest itself.





The cooperation with organic farmers includes a great diversity of approaches. Forms of cooperation range from research on a single commercial farm concerning an isolated factor in the system (such as cultivar choice, fertilisation, weed control method etc), to complex innovations where multiple farmers, various stakeholders and researchers work together. Research projects often involve farmers and stakeholders in order to take advantage of the available expertise and experience or to consult with them on challenges and possible solutions. This often forms the basis for well-focused research efforts.

The network is a prevalent form of participation in Dutch organic farming research, where researchers and farmers work together – sometimes with other stakeholders – on well-defined challenges, such as antibiotic-free dairy production, soil fertility improvement, or developing niche products. Bioconnect is the network organisation for the organic sector (see Chapter 3). In this network, entrepreneurs in organic food and farming systematically participate in research project teams. This gives them the opportunity to take part in the governance of the projects.

Co-innovation is a specific type of participatory research. In co-innovation projects, entrepreneurs from the organic food chain work together with research organisations to realise new innovations (see Chapter 12). The entrepreneurs invest their own resources in these projects to match the public funding from the research institutes.

In these projects, the role of the researcher is determined by what is needed in terms of content and process. The researcher's role therefore varies between expert, researcher and facilitator. The role of facilitator includes bringing together the relevant partners and attending to their questions and needs. It also means facilitating interaction and cooperation by creating the optimal conditions necessary for a joint search for possible solutions to complex problems.

Research approaches: a methodological overview

In organic agriculture research, different approaches and methodologies are often used simultaneously or sequentially. Baars (2002) developed a coherent model that clarifies and positions various research approaches in their mutual relationships, against the background of concepts from science and philosophy. The basis is a four-quadrant figure developed by Miller (1985) and further adapted by Bawden (1997) and Röling (2000).

Descriptions per quadrant

- 1 In quadrant 1, traditional causal-analytical research into isolated elements or aspects of systems is dominant. The researcher has a neutral and detached 'modus operandi' using verifiable and falsifiable research techniques. Regular mono-factorial research fits here. This is very useful for unravelling mechanisms.
- 2 In quadrant 2, the object of study is the whole system. Research approaches that deal with the system level fall into this quadrant. Farming systems research (prototyping) and agro-ecological approaches are examples. Systems in their context are at the centre of attention, the relationship between the constituting parts and the properties of the system as a whole are studied at each level. The approach is that of 'hard systems' research. In many cases the same methods are used as in quadrant 1. The researcher has more or less the same 'modus operandi'.
- 3 In quadrant 3, the system level in its context is still the focal point. In this quadrant, however, we deal with the way in which people create, interpret and maintain systems in interaction with others. Reality is multilayered and open to different interpretations. It is a social construction: people play a role in the interpretation of the world, people are involved. This quadrant deals

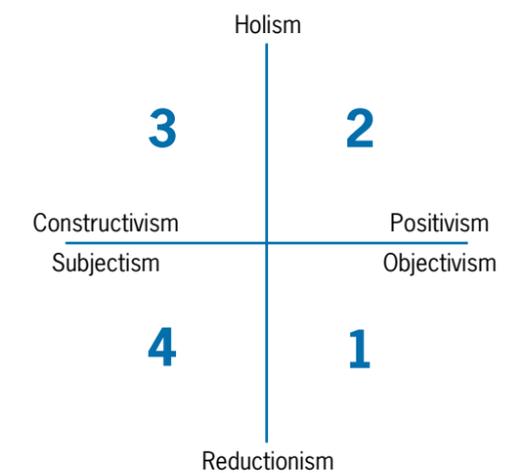


Figure 1. Different scientific paradigms as a basis for the distinction between different research approaches (Baars, 2002)

with human behaviour, the values involved, learning and negotiation processes. In this quadrant, predominantly 'soft' system approaches are used and connections are made between natural and social sciences. The research process itself is often also the object of study. In this case, the researcher is part of the research process.

- 4 In the fourth quadrant, personally-inspired participation in the surrounding world is what it's all about: situational behaviour based on local knowledge (which was gained in the real world) and an understanding of the best possible action. Baars introduced the term 'experiential-science' (also known as action research). The attitude of the researcher strongly affects the choice of the topics to be studied and the framework of interpretation that will be used. The researcher takes co-responsibility for the actions taken. This quadrant deals with elements of the system in the action as well as in the reflection.

In Dutch research on organic agriculture, research quadrants 2 and 3 are strongly represented. Quadrant 1 research will always be needed to unravel mechanisms, to study system components, to design new routines, to determine causal relations and so on. However, elements or components of systems that were studied in isolation have to be fitted into a system. This requires systems research. The system context, with its multi-objectives, will often reveal new problems in the interaction with other system components. Adaptations to these components are frequently needed. Consequently, organic farming research continually shifts back and forth between the different approaches and between holism and reductionism. It involves constant commuting between analysis and synthesis, on both the component and system levels.

The attitude of the researcher also has to shift between positivism and constructivism. When the system is part of society and the search for solutions is conducted with a number of partners, the researcher also gets involved on a more personal level. This means the researcher will also shift back and forth between detachment (observing) and involvement (participating), and between tacit and formal knowledge.

Developing relevant knowledge in cooperation with farmers and other stakeholders

In organic farming, the linear model of knowledge development was never really embraced. In the linear model, knowledge is developed by research institutes and subsequently disseminated by the extension service, leading to the adoption of new techniques by farmers (for example, the conventional agriculture 'miracle model' of the period following World War II). In contrast, most organic research takes an approach where cooperation with farmers is a crucial element, as was described earlier. This approach enables different perceptions of problems and solutions and different types of knowledge and expertise to confront one another and to interact, thus creating knowledge circulation. This confrontation optimises the chances for innovation. Additionally, it ensures that the developed solutions or innovations are sufficiently feasible and effective in the

context of the practitioners. Knowledge development is increasingly tailored to the specific needs of stakeholders. In the context of the future application, knowledge is co-created together with the relevant stakeholders.

Inspiration for increasing sustainability in agriculture

Organic agriculture is developing in response to its self-chosen ambitions and the differing views of stakeholders in the sector. In practice, the search for new and innovative approaches continues to strengthen the economic, technical, social and ecological performance of organic enterprises and chains. As described in this book, research organisations are working closely together with the organic sector on the continuing development of organic farming.

The innovations realised by organic agriculture do not stand alone. In conventional agriculture, the need to become more sustainable is also becoming apparent. In many ways, stakeholders and farmers are looking for new approaches, methods, concepts and markets. As a result, conventional and organic farming have more and more challenges in common. New approaches from organic farming can be very useful in conventional farming, and vice versa. The Dutch government is very keen to foster this cooperation. Sustainability concerns us all. It is not solely the domain of organic farming. But since organic farming has already made the choice for sustainability, its 'personality' will continue to inspire people.

Literature

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