# Organic agriculture in the Netherlands; developments and challenges

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## Introduction

Organic agriculture is an agricultural production system that uses matter, energy, knowledge and natural life for its production (e.g. food) and processes (e.g. food processing) and for providing services (e.g. green services). The production factor natural life is considered here a natural resource with particular sets of characteristics that – in order to function effectively – has to be respected. So proponents of organic agriculture assert that live production factors should have the right to decide in their own way about the methods of survival – whether as individuals or as a species – that are most appropriate to their particular circumstances.

Organic farmers developed production systems in which this condition could be met. In animal husbandry, for instance, the premises are that the animals should be free from thirst, hunger and malnutrition, free from physical and physiological discomfort, free from pain, injury or disease, and free to exhibit normal behavioural characteristics in the absence of fear or chronic stress (De Jonge & Goewie, 2000). In crop production, there are five underlying principles: (1) ensure a constant soil fertility, (2) ensure ample crop rotation, (3) ensure appropriate conditions for cultivation, (4) promote biodiversity in and around the farm, and (5) bring about mineral, water, and energy cycles. Organic agriculture also respects the quality of life in rural areas. Therefore three conditions need to be met with: (1) market relations between producers and consumers in a way so as to guarantee the producer a reasonable income, (2) contract work that leads to the development of the farm worker, and (3) the use of techniques based on self-regulating ecosystems that take into account landscape quality, as well as natural and cultural values.

This article describes the contribution agricultural science has made to the organic sector and the challenges this sector currently faces. We begin with an interpretation of the extent and significance of organic production, proceeding with a brief description of its history. This is followed by a presentation of the developments pertaining to biological production. The article concludes with a summary of the opportunities and the threats that are expected to confront organic production in the coming years.

## Extent and significance of organic production

Organic production is a remarkable phenomenon. It originated without the support of government, scientific institutions, extension services or special legislation. From the outset, organic producers were people acting upon an inner urge, passion, courage, perseverance and team spirit. Already at an early stage they saw disadvantages in the use of synthetic chemicals and therefore maintained traditional methods such as crop rotation and organic manuring – methods that they considered trustworthy.

Organic producers appeared to have gotten it right, as it became increasingly clear that intensive farming led to a number of markedly undesirable side-effects. As a result, research institutes are now reconsidering, amongst others things, traditional forms of crop rotation and traditional methods of manuring.

Nowadays, organic production is widely accepted (Anon., 2001). In 2001, worldwide turnover in organic production was 26 billion US dollars. This is expected to increase to 80 billion US dollars in 2008. The biggest producer in 2001 was the European Union with 12 billion US dollars. The most important European producers are Germany, England, Italy and France.

In the Netherlands, however, the percentage annual increase in organic production has dropped from 25 in 1999 to 14 in 2000 and to 8 in 2001. Attempts to curb this trend have not been successful. Present-day politicians, policymakers, producers, researchers and economists are increasingly unable to think in terms of long-term processes. Current thinking is primarily in terms of product (matter) and is short-term oriented (Röling & Wagenmakers, 1998). Process thinking almost disappeared when agricultural sciences became a formalized 'hard' science. But this is not the only reason for the current growth depression. Are other factors not involved as well? Before answering this question we first review the history of organic production in the Netherlands.

## History of organic production in the Netherlands

The history of organic production in the Netherlands is schematically presented in Figure 1.

Organic farming in its modern sense came into being in the 1920s, largely as a reaction of dissent among farmers and consumers about the use of chemical fertilizers and synthetic pesticides (Balfour, 1943). These people were afraid of becoming increasingly dependent on supply industries and trade organizations. Pioneering organic farmers were keen to retain their autonomy at the forefront of their profession (Conway, 1994). They joined hands and eventually became a movement comparable to

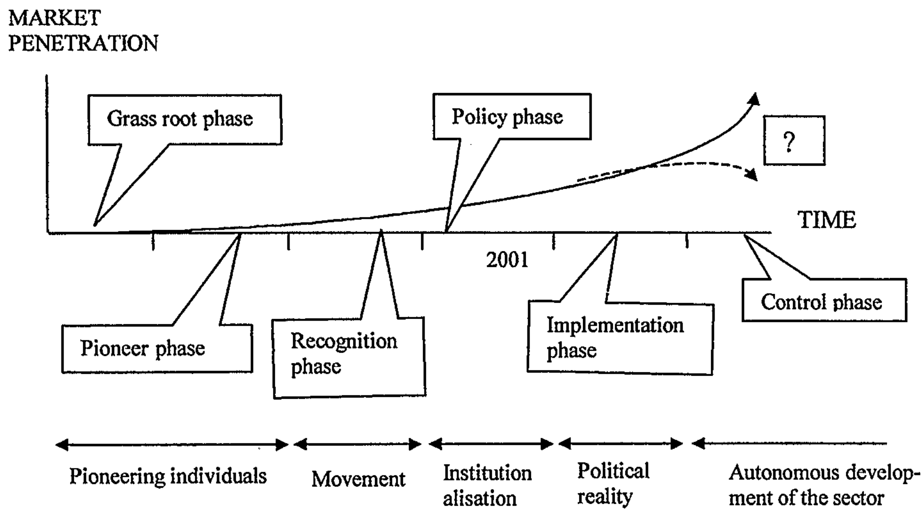


Figure 1. History of organic production expressed as a function of market penetration with time. The solid line represents the partly realized and expected developments. The dotted line extrapolates what can be expected from 2001 onwards. The question mark indicates where knowledge may support further growth of organic production.

today's Dutch environmental co-operatives (Touwen & Fleischer-Van Rooijen, 1993). Later, the use of chemical fertilizer was rejected for other reasons as well. Firstly, evidence appeared that chemical fertilizers destroy nitrogen-fixing bacteria and vescu-lar-arbuscular mycorrhizae, which are the very micro-organisms organic farming depends on. Secondly, objections grew against the amount of energy needed for the manufacturing of chemical fertilizers[1]. Reducing the use of non-renewable fossil fuels was and still is one of the objectives of the organic movement (Anon., 2000a).

In the 1990s, organic farming obtained consumer recognition. Political acceptance followed in 2000 (Anon., 2000b). Nowadays, organic producers are expected to proceed without government stimulation measures. They will have to become self-supporting with regard to sector developments, marketing, and product certification. Organic producers will have to be able to survive in a competitive market.

## Identifying developments and challenges concerning organic farming

Pioneering individual farmers joined hands in a movement, which, together with consumers, sought for ways to facilitate organic production. Their goal was to produce

1 The production of one kg of chemical fertilizer nitrogen demands 40-50 MJ, whereas one kg of nitrogen produced by alfalfa requires 15 MJ. Nowadays, energy reduction is of much more relevance, as organic products are exported all over the world. For example, to fly a 5-calorie strawberry from California to New York costs 435 fossil-fuel calories.

using farm-bound natural resources only, thus trying to become independent of synthetic external inputs. They did so, supported by field research and exchange of empirical knowledge, accepting lower outputs. To limit their losses a growing need for scientific research manifested itself. To meet this need, those involved in organic production set up their own organizations for research, promotion, trade and retailing, organizations that in turn finally linked up with mainstream-oriented institutions.

During this institutionalization phase (Figure 1), organic producers were not only interested in the conversion of individual farms, but also in the creation of a complete organic sector. Links with mainstream suppliers, producers, trade organizations, retailers, consumers and relevant non-governmental organizations came into being. These links fostered a general increase in curiosity about the principles underlying organic production, as prior to making any investments organic farmers required objectified explanations for the success of their form of production. Moreover, knowledge about organic production could also influence mainstream production by bringing this into a sustainable mode of development (Lantinga *et al.*, 2000). So during the political phase (Figure 1) also people involved in mainstream agriculture had to be convinced.

In summary, organic farming developed and shall continue to develop along three lines: (1) conversion of individual farms; (2) the scaling up to an organic sector; and (3) convincing stakeholders outside the organic sector.

## Developments

This section discusses the role played by scientific research in the conversion of individual farms and the scaling up of the organic sector as a whole. It concludes with a consideration of the cogency of organic farming as a method of production.

### Conversion of individual farms

The conversion of a farm includes the following aspects: soil, crop protection, farm structure and farm surrounding.

*Soil management*

In organic farming, soil research is based on the principle that a soil is an ecosystem. That is to say, the whole is more than the sum of its components. Indeed, system properties like buffering capacity, self-cleansing, stability, food webs, predation, immunity or structure cannot be restored at the level of the individual components (Anon., 1993). Organic producers consider these properties as natural resources, which if used properly help the farmers stay independent of artificial inputs.

Knowledge about natural soil development processes helped farmers in understanding how the conversion of their farms to organic production could be made more efficient and effective. Scientific knowledge about soil life in general, and about soil formation and degradation processes, accelerated this development.

A farmer starts the conversion of his farm by ascertaining and specifying the status of his soil. He then determines which treatment and manuring methods are most appropriate. All interventions must suit the development of his particular soil. As to the topsoil the farmer seeks to attain a state of dynamic stability by adopting suitable methods of cultivation. Furthermore, he stimulates soil life by paying due attention to the organic matter content of the soil. So besides supplying nitrogen, phosphate and potassium, organic manure is also important for its carbohydrate content

Organic farming would have been less effective without scientific knowledge about processes like humification, mineralization and the formation of organic matter in soils free from chemical fertilizer (Gray *et al.*, 1971). The same holds for the scientific contribution that enhanced our understanding of soil life (Brussaard, 2001). This knowledge was applied in the development of soil tillage practices for improving soil structure and controlling mineralization processes by farm management. Scientific knowledge about animal manure and compost has grown enormously too (Van Ginkel, 1996). As a result of these scientific advances interest in mixed farming has grown proportionally (Goewie, 1998).

Organic farms do not use inorganic fertilizers. So the question arose as to how farmers who fertilize their land with organic manure should calculate their mineral balance. Research into this question produced two important models: the FARM model (Oomen & Habets, 1998) and the N-DICEA model (Habets & Oomen, 1997). The FARM model is used to establish where a given farm is losing nutrients. The N-DICEA model makes it possible to calculate nitrogen flows within an organic farm.

Another important factor was the understanding that apart from nitrogen, phosphate, and potassium, manures containing carbohydrates are also necessary. So the C/N ratio became a suitable parameter for assessing the soil fertility of organic farms (Van Der Werff *et al.*, 1995). The discovery that vescular-arbuscular mycorrhizae play a decisive role in the management of soil phosphate at organic farms contributed to the development of improved crop rotations (Dekkers & Van Der Werff, 2001).

How farmers could enhance mineralization processes in organically fertilized soils during periods when soil temperatures are low (early spring) is still unknown. This issue and the questions it raises should be seen as a challenge to further research into organic manuring.

### *Crop protection*

In organic agriculture, diseases and pests are considered to be the result of an imbalance between the crop or animal and the environment in the widest sense of the word. The organic farmer sees the sensitivity of an organism to a disease or pest as a lack of vitality of the organism to resist infection. This sensitivity is assessed by the degree in which crops and livestock grow regularly, without problems or complications. This growth and development are partly genetically determined and partly by production conditions (soil, fertilizer, nutrition, conditions of germination, operational hygiene, weed occupation, density). A well-developed capacity to adapt to extreme conditions ensures sufficient resilience.

Organic farmers try in the first instance to protect crops and livestock by preventive measures. If a disease or pest manifests itself despite such measures, the farmer will apply biological countermeasures. In a worst-case scenario, the farmer is compelled to terminate production and destroy the crop.

Preventive crop protection takes place primarily through increasing a farm's biodiversity in time and space. The farmer thereby not only supplies nectar and pollen to predators relevant to the functioning of his farm, but also wintering opportunities and areas of refuge during cultivation activities (Sehested *et al.*, 2000; Roepsdorff *et al.*, 2000). Smeding (2000) demonstrated that food chains do indeed appear more often on organic farms. Soil-borne diseases and pests are avoided above all by means of well thought-out forms of crop rotation. Research on animals makes clear that animal rotation equally contributes to reducing the pressures of disease.

Crop rotation serves as a multifunctional tool in crop cultivation, addressing two important objectives. It helps to maintain soil fertility and at the same time reduces the incidence of pests and diseases. But these benefits are borne out only if the farmer knows how to create temporal sequences of crops at a production site (Wijnands, 1999). For example, the production of a crop that takes up large amounts of nitrogen needs to be counterbalanced by the production of a succeeding crop that delivers nitrogen to the soil. In general, successive crops must compensate for the one-sidedness of preceding crops. It is unlikely that such important knowledge would have been available without the endeavours of crop science.

The starting point is a six-year crop rotation. Maximal crop frequency is 1:6 and maximal family frequency is 1:3 (Wijnands & Van Koesveld, 2000). These ratios meet the requirements for soil health, crop protection, risk dispersal and opportunities for weed prevention optimally. In mixed farming, crop frequency may decrease to 1:8 or more. This is possible if grass leys or fallowing are included or if special nitrogen-fixing crops are planted.

In the foregoing, the most important scientific contributions to organic crop protection have been listed. An important challenge for research in organic crop protection concerns the susceptibility of animals and crops to micro-organisms (Yarwood, 1959; Colhoun, 1979, Daamen *et al.*, 1989) in relation to soil nutrient levels, nutrient balances, and stress.

### *Farm structure*

Knowledge about the optimalization of operational processes at organic farms has made an invaluable contribution to the improvement of farm structure and management (Aarts, 2000). It has also become clear that organic farms are suitable tools for the development or preservation of a viable countryside. The formation of buffer zones around nature conservation areas, or a role as wardens of the landscape, turned out to be functions that organic farms were eminently suited to fulfil and, moreover, were functions even accepted by the European Commission as feasible and meaningful (Anon., 1996).

The development of so-called 'partner farms' (Baars, 1998; Nauta *et al.*, 1999) led to new ideas about co-operation between farmers. Partner farms can basically be considered as mixed farms that are separated from another by a given distance. Besides increased co-operation, partner farms also make the widening of crop rotations possible. Nevertheless, the practicalities involved are as yet largely unexplored and require further research.

The management of organic farms is not easy, as this involves many more goals than farm profitability only (Vereijken, 1992). The so-called 'prototyping technique' provided an advanced methodology for the effective conversion of farms. This particular methodology not only leads to optimized farm structures but also improves farm management. So prototyping – being a kind of agronomic designing (Tekelenburg, 2001) – became a good example of heuristic learning by advanced farmers.

In the foregoing an outline has been presented of the most important scientific developments in the field of farm structure and management. Research into the possibilities of the development of salable forms of green services still is necessary. It requires that consumers acquire a greater awareness and understanding of the extent to which organic production effectively contributes to the development of a clean environment and natural values, including animal welfare.

*Farm surroundings*

Research focusing on the relation between a farm and its surroundings is still limited. Smeding & Booij (1999) and Mäder *et al.* (2002) have demonstrated that organic farm management contributes to the development of food webs both at and around the farm. Such webs may be considered as a buffered form of biodiversity. Food webs are of significance not only for the development of biologically diverse surroundings, but also for the ecological protection of soils, crops and animals against pests and diseases.

A better understanding and awareness of the importance of organic farms as instruments for landscape protection and development led some governments to support farmers who wanted to convert their mainstream farms to organic ones (Van Mansvelt & Van Der Lubbe, 1999). Farmers came together in what have been named environmental co-operatives, which in many cases succeeded in augmenting their income by providing green services in the public domain (Touwen & Fleischer-Van Rooijen, 1993).

From the above it can be concluded that the holistic approach has provided the organic sector with at least three things:

1. A conscious use of the soil as an ecosystem, leading to the protection of soils and groundwater.
2. Applied operational hygiene and preventive crop protection, which have reduced the dependence on chemical pesticides.
3. The 'despecialization' of farms, which is of demonstrable practical value for the development of a viable countryside.

## Scaling up to an organic sector

The scaling up of farms covers five aspects: (1) farm economics, (2) labour, (3) price setting, (4) product quality and (5) certification.

*Farm economics*

Compared with mainstrem agriculture the average yields for organic farming are lower than current. Depending on the commodity, differences range from 0% (e.g. milk) to 45% (e.g. potatoes). Heavy losses can usually be attributed to calamities such as diseases. In order to compensate for the lower yields, higher risks, and the additional costs of certification, distribution and trade, a higher price is necessary. So continuity of organic farming requires that at least the market indemnifies the production costs. But market prices – including those of organic products – are under pressure from cheap imports and increased supplies. Moreover, trade tends to base the price of organic products on those of mainstream products. As mainstream products have not been priced for a long time according to their cost price, organic production could fall into the same hole mainstream agriculture once fell in. The price of organic agricultural produce would then once again be shifted on to the environment, animal welfare, and developing countries, which would be in conflict with the starting points of organic production.

On the whole, organic farms on good soils are still reasonably remunerative. But there is reason for concern. In case of falling market prices for organic products, a wage increase for farm labour or fluctuating yields as a result of environmental circumstances, organic farming will become more dependent on scaling up, co-operation between farms and mixed farming. So it is important that the consumption of organic products is stimulated at stable prices.

### *Labour*

One of the risks incurred by a farmer when deciding to convert to organic farming is the increased need for labour. Indeed, research (Leferink & Adriaans, 1998) indicates that for mainstream farmers and arable vegetable growers, the greatest disadvantage of conversion, apart from reduced yields, is the considerable amount of labour required. The experience of organic dairy farmers confirms this: an increase in required labour is inherent to organic farming due to the manual control of weeds needed for this particular method of farming (De Jong & Van Zoest, 2001). For mainstream farmers wishing to convert to organic farming, the process would be made easier by a greater price certainty and financial safeguards for the first five years after conversion. The high demand for labour in organic agriculture – primarily the result of labour-intensive weed control, but also because of other conversion difficulties – is especially acute during the period of conversion itself and during the first years of actual organic farming. Once the weeds are under control, there is a significant decrease in the amount of labour required (De Jong & Van Zoest, 2001).

### *Price setting*

The price of organic products exceeds current norms, thus hindering an increase in consumption. Consequently, environmental organizations are making efforts to achieve A-class qualities in organic production, expecting that such qualities will boost consumer confidence. I suggest that the retail trade on figurative grounds promotes organic products. There is a trend from supermarkets to use notions of organic as a mark of distinction with other supermarkets. The competitive, economic motive is more important than communication about the background of organic products. But this is possible only if it can be made clear to the consumer what the added value of organic products actually means in terms of his or her health and the immediate environment. Consumers have to be able to experience a tangible added value in order to be able to justify the higher price for organic products. The knowledge required for this is almost entirely lacking.

*Product quality*

The discussion about the quality of organic products focuses mainly on the question of whether these products are safe. Especially speculation about the presence of toxic substances introduced by crop breeding and selection (e.g. alkaloid) or resulting from a mouldy product (e.g. mycotoxins), plays a role. There still are insufficient points of contact for both categories of problem. The chances of toxic substances being present in certain varieties are small, since organic producers are forbidden to grow varieties not permitted by government. Similarly, the chances of organic products containing mycotoxins seem to be minimal (De Nijs, 1998) due to the possible presence of active antagonistic organisms.

*Certification*

In Europe, certification and inspection are well developed. The inspection of authenticity of organic production processes in all European countries is based on EU ordinance 2092/91. Not the authenticity of the end product is paramount, but the authenticity of the production system. Individual countries can apply stricter regulations than the European ordinance, but can never mitigate it. Generally, European countries – except the Netherlands – are stricter. This is because the Netherlands, as an active trading nation, both exports and passes many organic products in transit. So the Netherlands is better served by an unambiguous certification of products than of production processes. In case of the latter often interests of a regional nature (e.g. regional values) are involved. So within Europe there is a need to harmonize the supervision and inspection of organic production.

The tendency to allow inspection of organic production to develop in a more product-oriented way is strengthened by the need of food industries and large supermarket chains for tightening up health and safety inspections of products. Since the introduction of the Hazard Analysis of Critical Control Points (HACCP) in 1995, a shift in focus of attention to product characteristics at the expense of production system characteristics can be observed. The organic sector, which also wants the inspection of system characteristics like closed cycles, animal welfare, landscape conservation and sometimes even of fair trade, will encounter difficulties as a result of this shift.

In summary, it is clear that the organic sector will only be able to expand if it fulfils market demands. These demands include: sufficient production of a wide variety of products at a reasonable price, and deliverable at any given moment and in any given quantity. To this end, scaling up of organic production is a prerequisite. Scaling up becomes effective when scientific research generates information about the five aspects discussed above. It is equally clear that the holistic approach to questions about possibilities for scaling up has yielded two results: (1) we know more about how consumer concerns should be addressed, and (2) although still difficult, socially desirable forms of green services are now within reach.

## Convincing stakeholders outside the organic sector

Most agricultural experts do not unequivocally accept the organic production method. This is understandable because it not only is more difficult to manage a form of production, also in terms of trade and distribution, it can also mean the destruction of (often borrowed) capital. So convincing evidence is needed to prove that organic agriculture has an added value. The most important aspects in this connection are: (1) research about the extent to which converting producers were successfully able to apply organic production methods in practice (skilled organic farm management), and (2) questions about risks, health, safety, and the naturalness of organic production methods.

### *Skilled organic farm management*

The performances of organic farms have been studied comprehensively by Wijnands & Van Koesveld (2000). From their study it appears that about 60% of the organic farmers have a limited understanding of the operative dynamics of crop rotation, nor do they know how to apply crop rotation correctly. Parra & Goewie (in preparation) observed that an increasing number of new organic farmers simply tend to substitute synthetic chemicals for natural ones. Given these observations, the principle that organic production aims at preventing rather than curing problems becomes redundant. Evaluation studies of organic farms also indicate that the share of cash crops in crop rotations tends to become too large. For instance, too many leguminous crops – although perfect from a soil fertility point of view – makes the rotation vulnerable to pests and diseases.

About 25% of all organic farms apply more nitrogen than allowed according to the EU Nitrate Directive – 170 kg nitrogen per ha from organic manure. For horticultural farms this percentage is even higher than 40 and especially concerns smaller farms on vulnerable soils. In terms of the Dutch Mineral Accounting System (MINAS) (Henkes & Van Keulen, 2001), about 12% of the organic horticultural farms exceed the standard with more than 100 kg nitrogen per ha. Organic arable farms do not appear to have a MINAS problem. As to phosphate (P), about 60% of the organic farms exceed the standard of 20 kg P per ha. Also in this case, a high surplus is found on small horticultural farms with vulnerable soils. In MINAS terms, about 50% of the horticultural farms and 30% of the arable farms exceed the standards (Henkens & Van Keulen, 2001).

It appears that the organic-farming concept did not fully convince farmers of the theory behind crop rotation. This must be partly due to a lack of knowledge with the farmers and extension workers. So there is much need for more knowledge and education about farm system development and management. Research into this matter, however, is expensive and time-consuming and is not easy to carry out. Another need concerns electronic farm management. Production flow management is a promising answer to that (Wolfert *et al.*, 1997).

2 170 kg nitrogen total in organic manure.

*Risks*

An important point that can influence a farmer's decision when considering conversion to organic farming, is the fact that where organic production is concerned he is a starting entrepreneur. He is starting a type of enterprise that in the past often has operated reasonably to very well over a number of years. In order to ensure success, both immediately and in the near future, the farmer will be reluctant to take too many risks, especially in the beginning. To convert a farm while at the same time having to familiarize himself with an entirely different way of thinking (e.g. not using synthetic pesticides), as well as an entirely new sector, are two prohibitive risks. In particular the farmers who are largely dependent upon borrowed capital will take such risks only with extreme reluctance.

*Public health and safety*

Organic producers assume that a clean and healthy commodity is the result of a clean and health-conscious production system. There are indeed a number of indications supporting this assumption, but so far no conclusive evidence has been obtained (Van Vliet, 1998). It can nevertheless be argued that greater insight into the positive relations between organic consumption and basic human health and safety would boost sales of organic products. Of great interest in this connection is the new quality concept for apples (Bloksma *et al.*, 2001).

*Naturalness*

Most consumers assume that organic farming is good because it is natural. This element of naturalness, which is an integral part of the image of organic products, sells itself. Verhoog *et al.* (2002) and others provide evidence that this perceived naturalness does indeed play a crucial role in the expectations of consumers when buying organic products. The same holds for policymakers advocating organic farming as a tool for rural development.

In summary, there is no generally accepted knowledge that convinces mainstream farmers, scientists, and extension officers of organic production offering a realistic perspective for the development of sustainable agriculture. It nevertheless is interesting that the holistic approach of supporters of organic production has renewed thinking about farm management, product health and safety and breeding and selection.

## Challenges

The challenges confronting organic agriculture are not only of a technological and scientific nature. How the sector responds to the increasing internationalization of agricultural policy and to the negative perceptions of agrarians and agricultural experts is also of vital importance.

## Internationalization

The development of organic agriculture depends on the extent and stability of the demand for organic products. In the Netherlands this demand is low, for which there are two explanations. Firstly, the quality of mainstream agricultural products is high and the prices are low. Secondly, the Dutch government has developed an excellent system of supervision and inspection to safeguard health and safety of agricultural products. The average Dutch citizen has become used to this high quality, low price, and safety. Attempts to make the Dutch government less complacent by referring to current developments in Denmark, Germany, and Austria are – for the reasons given below – unrealistic.

Denmark, a country in which organic farming was indeed able to grow rapidly due to a very active government, demonstrates that organic products can constitute approximately one third of the total domestic demand for agricultural products. The rapid growth can be explained by the fact that the Danish government has sufficient interventions in daily agricultural practices to implement its policy. In Denmark the majority of farmers are mixed, which makes conversion to organic farming considerably easier. In the Netherlands most farms are highly specialized.

Organic production in Germany, likewise a country with a strong domestic demand for organic products, is also growing considerably. On the one hand this is due to the mixed character of many German farms, while on the other it is the result of federal legislation stipulating that the place of origin of all products must be indicated. Such legislation advances the distribution of domestic products at the expense of foreign imports.

The Austrian government is successful in its stimulation of organic agriculture because farms in rural areas (mountains and isolated areas) are seen as means for the conservation of landscape and natural values, for the prevention of erosion, and for the viability of the countryside. This guarantees the country's attractiveness to tourists, which is something of macro-economic importance.

## Perception

The perception of organic agriculture by farmers, researchers, and extension workers is overwhelmingly negative (Kinsella, 1995; Leferink & Adriaanse, 1998). The image farmers have of organic agriculture is not only passed on by their respective families, but is also influenced by friends and colleagues. Through a process that can be described as collective- or group thinking, colleagues probably sustain the image thus formed and retained, both by farmers and agronomists. During meetings, people in positions of authority who by means of sceptical questions or remarks about organic agriculture indicate their disapproval, set the prevailing tone. The group as a whole acquiesces in this, and subsequently a sort of collective opinion or judgement about organic agriculture is formulated (Adolfse *et al.*, 1998). Group thinking reflects an extreme, even excessive method of seeking general agreement among individuals who – by virtue of a particular form of participation – constitute a particular kind of group. One of the most important reasons for this is attributed to the search for and maintenance of a certain identity within a world where people are entirely dependent on the opinion and judgement of others for their survival (Turner & Pratkanis, 1994).

### Dealing with adverse forces

So the development of organic agriculture in the Netherlands is therefore not so much dependent on what the government does, but on the knowledge needed to convince stakeholders that organic production offers a considerable added value for society at large. The big point is to bring this added value across in a convincing and practicable manner.

## Conclusion

In the beginning, organic production developed rapidly by its own animating vision, standards, internal cohesion, agencies and idealism. Now it has entered the policy phase (Figure 1) and has to compete with mainstream producers.

This entails new challenges. Table 1 summarizes the threats and opportunities the organic sector will have to face in this endeavour. The pertinent question is whether the organic sector is both willing and able to adjust. I have come to the conclusion that the success of organic production is based on producers who are well motivated about their roles in society at large. These producers need to be empowered and therefore enabled to put their holistic views into practice, and show a strong will in terms of

Table 1. Summary of challenges organic farming will face when seeking further expansion.

| Forces adversely affecting organic production in Europe | Expected development in the organic sector | Long-term result |
|---|---|---|
| Governments tend to withdraw. Societal developments are determined by market forces. | Due to their adverse price/image ratio, organic products have great difficulty in competing on a free market with commodities produced in bulk. | Area under organic cultivation in the Netherlands will increase only very slowly. |
| The Dutch have a strong and well developed export tradition. | Export will decrease as importing countries begin supplying their home markets with home-grown organic products. About 70% of Dutch organic produce is exported. | Area under organic cultivation in the Netherlands will increase only very slowly. |
| Technological development is in the hands of big investors. | Gene technology and precision farming will undergo rapid development. | Organic farming is deemed to be considered as old-fashioned, as difficult to manage and as unnecessary. |

| | | |
|---|---|---|
| Increasing conflicts between organic and mainstream producers, about pests and diseases, at the borders of their respective lands. | Certain pests and diseases, GMO contamination and health issues force the organic sector to comply with mainstream laws and regulations. | Organic farming loses its added value. |
| Strong promotional campaigns about health and the environment targeting consumers. | Organic sector becomes uncertain as to what it wants to communicate. It has to pay attention to issues that have no priority from organic producers' point of view. | Misguided expectations and general misunderstandings ruin organic farming's image. |
| Globalization. | Commodity thinking will dominate production-process thinking. | Organic farming loses its added value. |
| Price of organic products will drop. | Profitability of farming comes under pressure. Cash commodities will dominate production. | Organic farming loses its added value. |
| Trade brands take over certification process. | Commodity thinking will dominate production-process thinking. | Organic farming loses its added value |
| Supermarkets play a key role in the stimulation of organic purchases. | Sophisticated information systems about organic farming emerge. | Professionalization of the organic sector. Health shops come under pressure. |
| Good Agricultural Practice (GAP) becomes the leading principle in global trade. | Commodity thinking will dominate production-process thinking. | Organic farming loses its added value. |
| Enhanced economy-of-scale policies within the agro-industrial complex. | Added values come to mean balancing items in order to obtain quick returns on investment policies in trade and marketing of organic commodities. | Organic farming loses its added value. |
| Agricultural Knowledge and Information Systems become privatized. | Group thinking makes organic farming redundant. | The concept of organic farming is considered to be a well reasoned belief without practical meaning that will disappear as soon as other forms of sustainable agriculture emerge. |

organizing their know-how and supporting information networks according to their own criteria. The future success of organic agriculture will be determined above all by consumer demands. These demands, as I have shown, are mainly determined by three factors: (1) safe and healthy products, (2) contribution to animal welfare, and (3) contribution to a cleaner environment. So my conclusion is that the organic sector, if it wishes to retain its added value, cannot adjust to market demands without qualification.

It is my opinion, therefore, that the future of organic farming lies in finding a vigorous niche, delivering high quality commodities and simultaneously supporting a good quality of life in rural areas. These aspects will contribute to farmers' income, thus ensuring the continuity of this much-wanted type of agriculture and creating strong producer-consumer relations. These effects will be reinforced provided the sector is able to certify the added value of organic production in a traceable, transparent and controllable way at an international level.

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