

6 Certification: bringing the added value to the market

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Introduction

More sustainable food production methods clearly provide an added value to society in comparison with traditional methods of farming. However, the question is: “value added to what?” In addition, other questions quickly arise as:

- what is the added value,
- how can it be expressed and made explicit,
- is this added value reliable,
- measurable and controllable,
- who is interested in this added value and
- is someone willing to pay for this added value to appreciate it in a way that contributes to the farm income and farm continuity?

In this contribution, recent developments in certification are analysed against a historical background. These developments will be related to organic and integrated food production.

Intensification, increasing problems and the reaction of stakeholders

Intensification, free market production, problems

Crop rotations and food production techniques have been intensified ever since the Second World War. Long and varied crop rotations often with perennial pastures of grass and clover were replaced for (short-term) economic reasons by short rotations of a small number of cash crops. Soil improvement together with high yielding, but often susceptible cultivars increased the yield potential dramatically. The high yield potential could only be realised over a strongly increased use of fertilisers and pesticides. This intensive, technology driven agriculture has very one-sided objectives (ensure basic income and sufficient supply of food, fodder and resources) and tries to realise them by relatively simple and one-sided agro-chemical based methods (fertilisation and crop protection). An example is the use of pesticides. Current farming systems almost exclusively choose pesticides to correct the structural problems in farm management such as insufficient crop rotation, susceptible varieties and high nitrogen inputs. The one sided objectives and the one sided methods are the major cause of the complex of economic, environmental, agronomic and ecological problems that current agriculture got into.

The characteristics described above of current agriculture are typical for free market food production, which had for a long time almost no restrictions to the way in which food was produced.

The key problems of these type of farming systems are:

- the endangered quality of the *abiotic environment* mainly caused by the over-use of pesticides and fertilisers,

- the decline of *nature* (biodiversity) and *landscape* due to the “improvements” in farm structure and land management,
- the increasing *social costs* of agricultural production caused by pollution and overproduction,
- the *desertification* of rural areas, especially in the marginal (mountainous) areas in Europe due to the restricted *economic perspectives*,
- the ongoing pressure on the farmers’ basic income levels and
- the increasing concern around *animal welfare* in modern production systems.

World-wide, especially since the end of the eighties, there has been a growing concern with respect to these adverse effects of agricultural production methods on the quality of the biotic and abiotic environment. There is a growing awareness of the complex interaction between agriculture and ecology and the environment. Questions have been raised concerning sustainability with respect to dependency on chemicals, the use of non-renewable resources and maintenance of soil fertility etc.

Reaction of society and governments

“Free” agricultural production lost much of its freedom in a relatively short time after the Second World War. The loss of freedom started more or less with the introduction of chemical inputs. Governments recognised that legislation was necessary in order to check the quality of these inputs and their effects on food quality and farm labourers’ safety. In addition, agriculture would profit from an independent evaluation of the agricultural suitability of inputs and the accompanying instructions for use. Environmental concerns were introduced only later into the evaluation schemes. The first set of restrictions was directed to limit the types of products used. Since then, an ever-increasing number of issues are included in the evaluation schemes. Starting with Pesticide and Fertiliser Acts, this developed into pesticides and fertiliser policies. In first instance, the acts were directed to the allowance of the use of compounds; later, restrictions were made on the use of these compounds in the policies. In the policies concerning agriculture, agro-environmental issues were increasingly added to the agenda, followed by ecological issues such as quality of habitats, landscapes and nature (biodiversity). The EU introduced a pricing policy to safeguard the supply of inexpensive food and to maintain farming activities on a large scale (maintaining competitiveness in world markets with price interventions). Gradually, this agricultural policy had to shift to quota systems to restrict overproduction of certain commodities. In the seventies and eighties, the pricing policy became too costly and, in some ways, counterproductive and irrational. As a result, the policy shifted from price-based to land-based subsidies. Farmers were still supported; however, incentives that had caused overproduction were abandoned. Even schemes were introduced for setting aside land. The EU took the policy to the next level when

the concept of reciprocity was introduced in an attempt to restrict adverse effects and stimulate agro-environmental protection. It is known as the “cross compliance approach” - if we pay, we will want the desired result - a suitable concept to help move agriculture in the “preferred” direction.

Government policies typically address public concerns, which are not safeguarded by individual or corporate interests. This takes place at every level because every level of government authority under the EU adds or implements general policies. An increasing number of restrictions, rules and regulations are superimposed on agricultural production, influencing its development. All issues stated are translated into policies, region specific implementation plans, rules, regulations and stimulation packages. All of these developments add up to, what we will call here: different “packages of demand”. These packages are always related to methods of production, and differ depending on the authority and implementation incentives from EU, national, regional or even municipal levels. These packages contain restrictions, which are intended to direct agriculture towards more ecologically and environmentally sound production methods. As a result, these packages contribute to the biotic quality of rural landscapes and safeguard to a certain extend environmental quality.

In this respect, Good Agricultural Practice (GAP) is seen by many as a concept that constitutes the use of up-to-date farming technologies that can fulfil the current requirements of governments and society. GAP constitutes a basic level of technology applicable for everyone. In the context of the EU, 62 regions have defined their region-specific levels of GAP. The definition of GAP varies between regions, which partly is inevitable and partly offers the space for different interpretations of the concept.

Reaction of traders, consumer demands

Traders and retailers have increased their requirements as well, reflecting their market position and consumer concerns, as they perceive them. In first instance, they were concerned about (mainly external) quality. Later, in the nineties, this expanded to issues of food safety and sustainable production. It seems, after analysing their position, that traders and retailers have two main concerns: 1) maintaining and increasing consumer confidence and 2) avoiding liability claims. The first is concerned with quality assurance, food safety and the sustainability aspects of farming enterprises in their socio-economic context. The second is mainly concerned with food safety. The concerns about the way in which commodities are produced range from environmental impact to ethical questions. Multinationals are studying these issues at this time. How these concerns are translated into guidelines and restrictions differs considerably. EUREP, the European conglomerate of retailers in fresh produce, is one of the first European organisations that attempted to

follow a comprehensive, thematic approach to farming activities. Their approach is defined in production guidelines. The EUREP actions are discussed later in this article.

Research community divided

The research community has responded rather slowly to the increasing number of agricultural problems. The first group to notice these problems were the entomologists that responded to Rachel Carson’s “Silent Spring” (Carson, 1962). They started to develop alternative strategies for pest control: alternatives to an entirely chemical approach. This conceptually different way of working, known as IPM (Integrated Pest Management), developed and expanded into diseases and weeds, and then into all agricultural sectors. Due to the efforts of the IOBC community (International Organisation for Biological Control), IPM expanded into Integrated Production (see later in this article). However, political interests and the increasing focus on environmental and ecological questions were not broadly supported in the agricultural research community. It was the tireless efforts of the pioneers, which changed new approaches into workable strategies for farmers. The rest of the community received a great deal of criticism at the end of the eighties and during the nineties for their relative lack of contributions to solving urgent problems.

Integrated and Organic Farming

The concept of integrated farming was and is a research-based concept. The transformation into guidelines for farmers started end of the eighties in the German-speaking part of Western Europe; gradually moving into a restricted number of other geographical areas. During the nineties, some governments in Europe embraced the concept, for example, the German government with the Crop Protection Act and the Dutch government with the Agricultural and Crop Protection policy.

Organic farming cannot be considered as a reaction to agricultural intensification. It originated, at the end of the nineteenth and beginning of the twentieth century, based on the initiatives of individuals and small groups, who were looking for alternative ways of agriculture. However, it appeared increasingly to be a radically different approach as the intensification of conventional agriculture increased. Now, it is in fact a distinctly separate form of food production with a reasonably, well-defined “package of demands”, that is certified and labelled as organic production.

Image, blends and trademarks: jungle of claims

In addition to the developments mentioned above, based on concern for food quality and sustainability issues, a large number of trademarks, blends, and appellation *contrôle* concepts (guaranteed origin and quality) have been developed that address issues such as image, quality origin and regional-context, which appeal to consumers’ desire for authenticity.

All labels and trademarks, no matter what their origin and whether or not they have an official status, need certification schemes to prove their claims. However, all schemes together are resulting in a jungle of claims with little possibility for consumers to grasp the content of these claims. In this respect, action of governments is needed seriously to uphold a minimum standard of requirements and when possible, to reinforce the requirements by incentives or subsidies. All the other claims, requirements and labels are then above a basic governmental level.

Justification of production and certification

Scope of “packages of demand”: license to produce and license to deliver

Farmers should at least act in accordance with the law. Farmers can, however, increase their income or acquire a better position in the market by meeting the standards in the “packages of demands” defined by governments or markets.

These packages are defined in the changing coalitions between different partners in the field: society, markets, research, government and farmers/producers organisations. These packages have different contents and procedures, consisting of either prescriptions or guidelines with rules concerning what is allowed and what is not allowed, and they eventually lead to certification. This means in the current terminology that the farmer/producer has to have a license to produce (government or society, prerequisites and boundaries), and the license to deliver (from the markets) (Table 6.1). These packages may vary considerably in content due to the objectives and ambitions of the coalition. They can be production or chain-oriented and address different issues, such as the production process (minimise side effects of potentially polluting inputs), the handling and packaging (quality assurance systems), labour conditions, and handling of waste.

Figure 6.1 presents the issues related to primary production and Figure 6.2 illustrates the varying scope of the packages of demands and the different levels of ambitions.

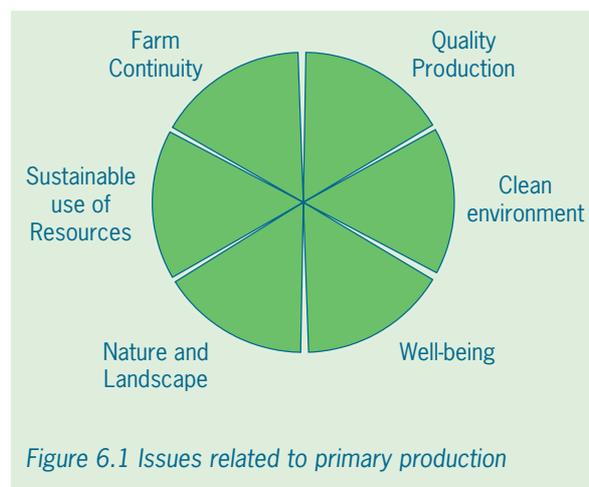


Figure 6.1 Issues related to primary production

Certification and related problems

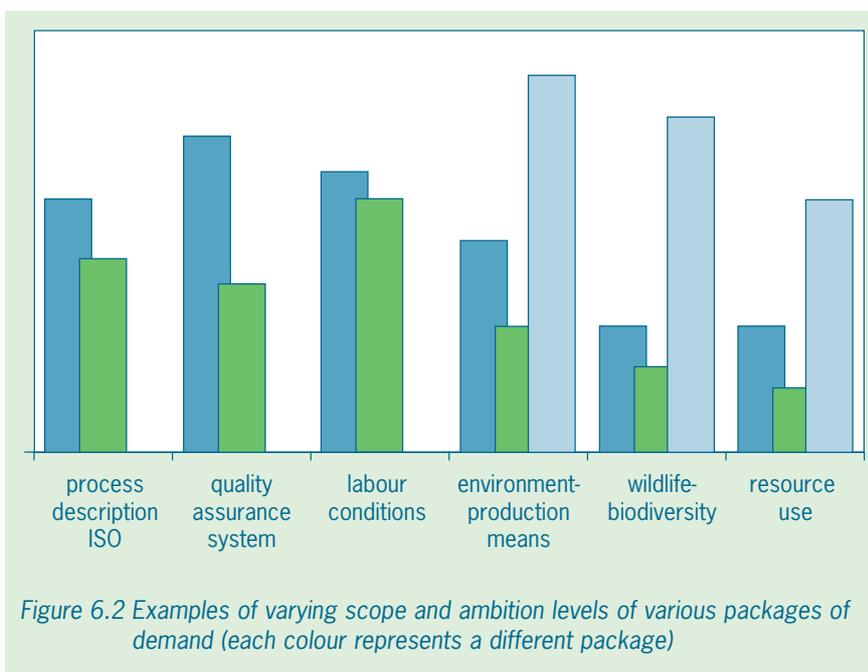
All of these packages have to be certified so it is important to define certification first.

- Certification = acknowledgement by a certifying body that a product, service, person or system meets the published set of requirements.
- Certification scheme = set of requirements for client and certifying body.
- Accreditation = acknowledgement as certifying body.

In this sense, these packages of demands are certification schemes. They are public. An independent organisation carries out the audits to check if the production is done according to the regulations. This independent organisation is authorised in most countries by an accreditation board. Key issues in certification schemes related to the primary production are the means of production and the cultural practices such as the use of pesticides and fertilisers, seeds, plants and the quality of the equipment (precision and potential losses). In addition, the first regulations on biodiversity and wildlife habitat management can be found in new schemes. The documentation of all farm data is essential in these schemes. In all schemes, the basis for pesticide use is the legal framework. Additional demands focus on additional protection of the environment

Table 6.1 License to produce and license to deliver

	License to produce	License to deliver
Actors	Society, governments	Private enterprises, retailers
Type of Concern	Public concerns	Corporate concerns
Issues	Environment, nature and landscape, biodiversity	Consumer confidence, liability
Focused on	Abiotic quality, restricting side effects, increasing nature and landscape values	Quality assurance systems, procedures, tracking and tracing, EUREPO-GAP
Incentives	Financial support (subsidies) or Judicial enforcement (Laws, rules, regulations)	License to deliver, seldom financial bonuses
Control	Judicial, certification schemes	Audits, certification schemes, corporate enforcement



advanced agro-technology is used. However, in order to achieve the desired results, this is a questionable approach. It is possible to state that the methods used to achieve the objectives are not relevant, as long as they are achieved. More positively formulated, the question is whether it is wise to limit farmers in their resources to deal with the problems and the objectives. Therefore, the first part of the certification cycle is to analyse the objectives and explicitly clarify them. The second step is to examine certifiable approaches that ensure the objectives are met as closely as possible. This is often a labour-intensive task because the existing databases and expertise must be interpreted.

The next task is to demonstrate

and/or the workers or beneficial organisms. In terms of agricultural practices, the schemes focus on Good Agricultural Practice or on methods beyond that. Concerning fertilisation, the additional requirements mostly focus on balances of input and output of P and K and adjusting N-fertilisation to the needs of crops and site-specific conditions. There are also many different types of certification. For example, the ISO-standards mainly indicate the necessity to document all practices and to carry out the actual documented practices. In other words, to make production processes clear and verifiable, for many customers a very handy tool. This indicates that not all certification schemes refer to changed or improved procedures in production or processing.

The monitoring and evaluation cycle

Finding ways to evaluate whether the certification schemes lead to the intended goals is the most critical problem in certification. The assumption is that the certification schemes are intended to help farmers reach certain objectives. Assuming that this is the case, the intentions and the objectives must be explicit and specified first. Then, these objectives have to be translated into guidelines and prescriptions. Especially the latter should form a certifiable set.

The problem is often that the objectives are output-oriented, referring to the status of, for example, the environmental quality. Usually, these types of parameters are not easy to access, due to the costs or the involved labour. Therefore, the regulations tend to focus on the production process and the way in which things are done, assuming that this will deliver the desired result. Specifically with the research-based concepts of integrated production (see following paragraph), the guidelines often prescribe the way to handle the production. This ensures that

and/or monitor in practice whether the intended (output-oriented) results have been acquired by the certification scheme and its prescriptions. This is often a weakness in the certification schemes.

It might involve measurements in practice or calculations derived from the collected data. Designing and carrying out a workable and reliable set of parameters and a monitoring system is a difficult task. The monitor (the total package of the monitoring system) should demonstrate the advantages of certified production compared to uncertified production. In addition, the monitor can pinpoint the weaknesses of the certification scheme: those aspects of the scheme that do not meet the targets. Additional adjustments of these aspects are necessary. This may require additional research to develop new techniques.

Main production directions for sustainable production, critical reflection

Three major directions in farming can be distinguished: conventional, integrated and organic. These are explained in detail below and the following questions are answered: what is their position in the development, how do they relate to these issues of certification and what is the added value to the market. Conventional is defined as world market-oriented agriculture within legal boundaries.

Organic production

Organic farming originated from the initiative of individuals or small groups to find new alternatives in agriculture. Organic farming has always been accompanied by strong philosophical visions. In spite of many differences, a broad consensus has been established concerning the intentions of organic agriculture. This is documented in the "basic standards for organic production and process-

ing” as formulated by the “International Federation of Organic Agricultural Movements” (IFOAM Basel 2000, www.ifoam.org). The standards can be summarised as follows:

- Production systems should:
 1. deliver high quality production (quantity and quality),
 2. be compatible with and/or optimise/enhance natural biological cycles and biodiversity, maintain and increase soil fertility,
 3. support genetic diversity within the production systems and the surroundings including protection of plant and wildlife habitats,
 4. minimise use of non-renewable resources and minimise losses from the ecosystem and
 5. balance animal and plant production and respect animal species integrity.
- The organic food chain should be:
 1. free of genetic modified organisms, using renewable resources, producing fully biodegradable products and
 2. socially just and ecologically responsible.

Regarding the general intentions and objectives, the following key issues often appear in books/presentations and discussions:

- respect and responsibility for the biosphere (social and ecological impact) and
- respect for and safeguarding of the integrity of humans, plants, animals and even landscapes, environment friendly, sustainable, natural and healthy.

This describes what is called “the level of intentions in organic farming”. The intentions are ambitious, however, often rather vague conceptual targets. Intentions have to be implemented and the first step is to define guidelines and global search directions. World-wide, organic farming is defined in terms of qualitative or semi-quantitative production guidelines addressing:

- the input of production means,
- management of animals and soil, the use of technology in processing and breeding (additives, GMOs) and
- general guidelines for appropriate crop rotation.

These guidelines are translated into controllable prescriptions a set of rules. The resulting certification scheme transforms organic farming into a controlled production system. The products are certified, identified by labels, controlled by certified organisations and harmonised (minimum production requirements) in the EU by the EU regulations 2092/91 and 1804/1999 for respectively plant and animal production. National certificate holders can add requirements or restrictions to the European regulations. Thereby, the requirements on organic production may vary per country (for example, pesticides). Guidelines, rules and prescriptions (the certification scheme) may be updated from time to time.

Critical reflection

Guidelines and regulations can be weak derivatives of the intentions. Moreover, they are usually focused on the

“how” (input and means) and not on the “outcome”. In other words, the certification scheme is input-oriented. This might be the reason that the current guidelines are, in general, not sufficient to safeguard the acquisition of the underlying intentions. Consider, for example, the “hard” environmental targets. It is absolutely not certain and documented that the current approaches can meet these targets. This is even more vague for issues such as natural, sustainable, safe and healthy because many aspects of these issues have not yet been implemented. In summary: the regulations are weakly related to the intentions because the intentions are insufficiently or not yet translated into quantifiable parameters and insufficiently implemented into guidelines and regulations. Moreover, most worrying is that the speed of development is too slow, given the ongoing developments in society and the markets (see below). It is questionable whether the organic movement is keeping up with the speed of developments in the markets. Is organic farming meeting the intentions, is it monitored?

Ongoing and shifting perspectives

Governments see farming increasingly as a social activity and farmers as managers of “public” green spaces. Mono-productive agriculture will evolve into multi-functional agriculture with production as only one (however still the most important) of the economic carriers of farm continuity. Fulfilling the requirements of governments and societies gives farmers a “license to produce”. In recent years, a number of Northwest European governments embraced organic farming as the most promising production system for multi-functional agriculture: as a means to meet their targets. Moreover, issues such as sustainability and biodiversity are in the centre of the scientific debate and great efforts are being made to define these terms. On the other hand, the markets predominantly represented by the European retailers, also increasingly demand more from farmers. For conventional farming, this was defined for the first time in the EUREP-GAP guidelines for the European retailers (www.eurep.org). It is logical that organic produce will be checked against these guidelines as well. Moreover, there are already a number of European retailers that have higher demands to organic produce than what is defined in the label requirements in the countries of origin. The “license to deliver” will only be presented when these requirements are met. Organic farming has the potential to be the pioneer, the front-runner of agriculture delivering high quality produce and services to society. To fulfil this potential in a sustainable manner, the following steps have to be taken:

1. the intentions have to be transformed in quantifiable and measurable parameters and target values,
2. translated into technical guidelines and
3. at the same time, it has to be proven that organic farming can meet the targets by using regular monitoring programmes.

Only in this way, organic farming can give the depth and content to its own intentions and survive the embrace of

society. Immediate action is needed to keep the social “license to produce” and the markets “license to deliver” in the future. In fact, constant action is needed to stay ahead. Therefore, the organic farming movement should increase its sensitivity to the earlier mentioned developments, start the discussion internally and externally, and work closely together with the research community to explore new concepts.

Integrated production

Integrated production is a production method that arose from the efforts of the research community, is an addition to the legal restrictions, and requires more advanced agro-ecology in order to meet ambitious targets and to achieve more sustainable farming systems. The development of integrated production started in the sixties as a response to the biological problems caused by overuse of DDT (Rachel Carson, Silent Spring). Finding crop protection control strategies that were based on the use of different technologies and minimised chemical inputs was at the heart of this Integrated Pest Management approach. The concept expanded into the full range of crop protection and related agronomical questions. Then this transformed into the concept of Integrated farming systems when broader interests were taken into account. The International Organisation for Biological Control stimulated this by offering a platform for the development of these ideas. European co-operation in the design and development of Integrated and Organic Arable farming Systems (I/O AFS) started in the early eighties, inspired by the promising initial results of two European experimental farms in this area (Nagele, the Netherlands and Lautenbach, Germany). Research leaders from institutes in four European countries (Germany, the Netherlands, United Kingdom and France) met within the framework of an IOBC study group, convened by Vereijken (Vereijken et al, 1986). This group evolved into an IOBC working group as this type of research expanded to more countries and research teams. At annual meetings, the group exchanged experiences (Vereijken and Royle, 1989).

In the following years, it became clear that this young agronomic discipline of Farming Systems Research needed an extra impulse to substantiate the research rationale. It was necessary to assemble interested researchers and to draw upon the pioneers’ experience to develop a research methodology. The opportunity to achieve this was offered by an European Concerted Action (AIR 3 CT 920755, “Research Network for EU and Associated Countries on Integrated and Ecological Arable Farming Systems”) that focused from 1993-1996 on the methodology of farming systems research (co-ordinated by Vereijken). The concerted action resulted in four progress reports and a manual, respectively dealing with designing, testing, improving and disseminating new farming systems (Vereijken, 1994, 1995, 1996, 1998, 1999). The Farming Systems Research methodology developed was called prototyping.

This farming systems research started in arable farming

on experimental farms and broadened to pilot farm approaches to develop interactively integrated and organic farming systems on practical farms. The first efforts in vegetable growing originated from the beginning of the nineties (Sukkel et al., 2000), leading to an European shared cost project with teams from the Netherlands, Switzerland, Italy and Spain (VEGINECO, FAIR 3 CT 96-2056). These proceedings are part of the latter mentioned project’s closing workshop.

In a number of European countries or regions, either governments, traders or retailers and farmers’ organisations in changing coalitions took up this research-based concept as a useful concept for policy or label development. Retailers and farmers organisations took the concept onboard, for example, in fruit production in Southern Germany and Switzerland. For vegetables, the concept was used to develop “Integrierte production” in Switzerland or “Qualita Controlata” in Emilia Romagna, Italy. However, the number of regions and type of products is, on a European scale, very limited.

Critical reflection on current status

Integrated production is an approach that is different over Europe. There are large differences in the scope of topics involved in the recommendations or in the certification schemes. Consequently, the significance of the approaches may vary considerably. Significance refers to the scope of the objectives and the extent that these objectives are achieved. It implies that a set of objectives is specified, unfortunately. This is not often the case. There is a vague plan, however not concretised, since often the approach itself is already considered beneficial enough to a large number of issues.

In the market, there is a real danger of over-differentiation of integrated production programmes and labels. How can retailers distinguish, how can consumers be expected to make a well-motivated choice? Integrated production is not a protected trademark, which means abuse can take place.

The IOBC organisation shares these concerns. They publish guidelines for integrated production for different agricultural farming systems. These are intended to be used as a base line, a framework from where interested coalitions can refer to design an integrated production approach and corresponding certification schemes (IOBC, 1999).

However, for integrated production, more or less the same criticism is applicable as for organic production: are the targets well defined? Are certification schemes effective in meeting the targets? Are the results monitored?

EUREP-GAP

The EUro-REtailer Produce working group (EUREP) has representatives from all of the major partners in the European retail market. Inspired by existing efforts and standards all over Europe, including the examples of integrated production; they formulated EUREP-GAP 2000 as a basic standard for production and as minimum

requirements to acquire the license to deliver (1997). It concerns an international commitment to GAP for fresh fruits and vegetables. The German institution, EHI, well known for the ISO-concepts, acts as the secretary's office. The intention is to commit growers more and more to the following issues:

- to maintain consumer's confidence,
- to minimise negative impact on the environment,
- to protect nature and wildlife,
- to reduce use of agro-chemicals,
- to improve efficient use of natural resources and
- to ensure responsible attitudes towards workers' health, safety, welfare and training.

The EUREP guidelines consider a wide range of issues, ranging from input-oriented regulations to farm management issues such as waste treatment and labour management. The initiative started in 1997 and the first draft guidelines were published in 2000. EUREP-GAP intends to incorporate integrated production concepts in their approach. The schemes are to be extended and sharpened over the years.

One of the problems related to EUREP-GAP is that GAP is defined separately for 62 regions in Europe. Therefore, fulfilling the GAP part of the schemes can have completely different meanings throughout Europe. Of course in some ways, this can be a reflection of the specific regional conditions. However, in a number of other aspects, it reflects different views of problems in the different regions.

Outlook: perspectives and constraints

Agriculture is in a transition process to multifunctional agriculture with farmers as the keepers of the green rural areas and delivering high quality products and services to society. They produce in a more sustainable way, safeguarding the quality of the environment while restoring and maintaining wildlife habitats and landscape. Many more aspects may be added. The requirements are high and the collective concerns at stake are important. However, all these different requirements, "demands", are leading to a jungle of "demand packages", rules, regulations and a forest of labels, brands and certified products. Still, from an agronomic point of view, two major conceptual well-developed production directions can be distinguished: integrated and organic production. The latter has the advantage of being well organised, having the same minimum label requirements throughout Europe, and delivering certified products under a label to a niche market.

Is there an added value to these two types of farming? The answer is, in spite of all the indicated shortcomings, clearly yes. It has added value concerning a large number of issues related to sustainability and the desired transition process of agriculture. This added value, however, has to be verifiable and controllable as explained above in detail.

Can this added value be cashed in on? Who are the

interested parties? As far as we can see, there are two parties with major concerns in this added value being produced: the market organisations and the governments. Organic production has found a niche market with higher prices. The added value mainly comes directly from the market. Governments are subsidising the transition process to organic farming and, in many cases, they consider offering farmers additional advantages to use organic production. The legal boundaries are often a bottleneck in this respect.

Integrated production has not found a niche market yet. Until now, it seems that retailers use integrated production as a marketing concept, giving farmers the license to deliver rather than providing them with extra income. Governments are considering all types of direct and indirect (tax benefits) payments to support farmers for performing above the GAP levels. In principle, this seems possible and an appropriate way of moving agriculture in the desired direction. In practice, massive problems are encountered in legislation. However, payments have to be justified and, therefore, "certification" schemes are necessary.

Markets are going to take responsibility only for issues that are directly related to their two main concerns: their image and their potential liability. Some issues might even be too complicated, such as assuring that their suppliers' safeguard groundwater quality. Governments will always have more extensive concerns than that of the markets. The governments will have to take their responsibility for maintaining their policies. In spite of current discussions concerning how governments should withdraw from active interference and leave many issues to the so much anticipated mechanism of the free markets.

In some cases, governments and markets have matching requirements, as is the case in Switzerland. In this case, the reward comes from the government in the form of direct payments. In the Netherlands, the same type of approach is being implemented. An approach towards the certification of all farms is being developed as a basis for supporting measures and as a mean of improving the implementation of agri-environmental policies. Integrated production seems to be the "royal supplier" of the much-needed advanced agro-ecology.

In order to progress, a broad approach is needed towards agricultural production and clear and ambitious targets have to be set. The corresponding certification schemes have to be developed on a national or regional basis. Performance should be monitored. Close cooperation with the research community is needed to ensure the continuous and relevant development of agro-ecology. Farming systems research such as in this Vegineco project, however difficult as it might be, is an indispensable tool.

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