The Concept of Best Agricultural Practice

Proposal of a basis for discussion

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Introduction

Since 2003, the concept of *Good* Agricultural Practice (GAP) is being implemented in EU policies and legislations following the so called CAP reform (Common Agricultural Practice). Basicly, the CAP reform is geared towards the framework of GAP of the FAO (FAO, www.fao.org/ag). The vision of common agricultural practice policy is starting to being realized by the political instrument of compulsatory cross compliance (Council Regulation No. 1259/1999; Council regulation No 1782/2003 and Commission Regulation EC No 796/2004), directing agricultural practices by financial incentives (EC, 1999a, 1999b). Character of the common "Good Agricultural Practice" is the increasing regulation of agricultural practices by governmental policies or non-governmental requirements via defined certification processes as instruments on EU/UN level.

Parallely, the term "Best Agricultural Practice" (BAP) arose introduced by NGO (e.g. www.undp.org/gef; PAN, 2004) but mostly simply used as synonym for non-regulated "Good Agricultural Practices" (Redman, 2003).

Here, we propose an integrative BAP concept in order

- To ease communication between all stakeholders concerned with agricultural practices.
- To review and integrate the most important existing terms concerned with agricultural practices.
- To demonstrate how a GAP/BAP combination could be used as a tool for sustainable rural development.

Existing terms related to agricultural practices and defined here are: Good Agricultural Practice, Best Agricultural Practice, Code of Conduct, information supply chain, production quality, and sustainability of product chains.

Good Agricultural Practice (GAP)

Good Agricultural Practice (GAP) approaches apply recommendations for the on-farm segment of agricultural product chains and post-harvest processes resulting in safe and healthy food and non-food agricultural products.
Recently, the term Good Agricultural Practice can refer to any collection of specific methods, which, when applied to agriculture, produce results that are in harmony with the values of the proponents of those practices. Because of that, there are numerous competing definitions of what methods constitute "Good Agricultural Practices", so whether a practice can be considered "good" will depend on the standards a farmer is applying. Consequently, the term is used to refer to private, voluntary and non-regulatory applications that are being developed and applied in a number of forms by governments, civil society organizations and the private sector to meet farmers' and consumers' needs and specific requirements in the product chain. The decisive characteristic of GAPs is the existence of underlying **catalogues of criteria**.

On basis of some catalogues of criteria GAP is formally recognized terminology used in the international regulatory framework (EC, 2003; Gündermann, 2005) with associated codes of practice (see below) to minimize or prevent the contamination of food potentially caused by the producer. It is or should be included in a continuous system of quality control (CAC, 2001).

The development of GAP applications in different formal regulatory contexts has been taken place in a coordinated way by FAO (2004). FAO provided an international and neutral

platform for intergovernmental, private sector and civil society dialogue on the development of a GAP approach towards concrete implementation of sustainable agriculture and rural development. Furthermore, FAO had initiated a process of consultation to seek understanding of the principles, indicators and applications of GAP. The actions should promote sustainable agriculture and natural resources management contributing to food security - access to sufficient, safe, and nutritious food - and improved livelihoods.

The GAP approach can provide a means for farmers to respond to existing standards, norms, and certification efforts. It offers management options for sustainable agriculture practice, taking into account universal criteria associated with environmental, economic and social dimensions. Characteristicly, GAPs are formulated for special segments of the agricultural production (e.g. “Good Plant Protection Practice”, Reschke et al., 1987; EPPO, 1994) or for specific production systems (e.g. “Good Practice in Potato Production”, EPPO, 2000; Medicinal Plants, http://www.inaro.de/Deutsch/ROHSTOFF/industrie/HEILPFL/GAPengl.htm). There are only some catalogues of criteria for on-farm production in a whole (e.g. EUREPGAP, 2001). Generally, GAPs end at the farmgate or after storage of products or raw material.
Nevertheless, GAPs have effects throughout the production-processing-consumption chain. Farmers and farm workers are those who directly decide how to apply the practices in the field demonstrating the special importance of farmers for the alimentation of people. The other actors in the production-processing-consumption chain depend on the farmers and indirectly influence those decisions by their demands.

Incentives can arise as regulations for food safety or environmental quality; economic subsidies, price premiums and access to markets develop from meeting certification or labeling standards and the demand that comes from consumer preferences (EC, 2003b). The GAP approach tries to address incentives for adoption within the current landscape of principles, certifications, accreditation, and labels, and the modern market context (www.fao.org). Certification following defined standards should result in transparency of production, reliability of producer, trade and retailer, and cross compliance of production techniques. The main goal behind the introduction of standards is traceability of agricultural production.

Best Agricultural Practice

GAPs are the framework for the performance of agricultural practices and – if already regulated – the base to be recompensed by positive incentives when complying with them. They are in that sense the “certification basis” of the system targeted to create common practices. GAPs obviously may initiate improvements to production techniques and to supply chain infrastructure (e.g. processing, storage, transportation). They are more and more fixed and less variable regulatory standards and policy instruments. Improvement, therefore, temporarily ends where the standards are fulfilled. GAPs are in that way conservative: they try to define a valuable compromise for *all* producers. They want to become *common* practice.

The proposed concept of Best Agricultural Practice (BAP) is innovative: BAP looks forward and the most important characteristic is to detect new solutions. Self-reflection and the

expressed will to improve itself are further characteristics. *Not* to be common is the goal but to select the best idea and the most progressive development in service of societal, ecological or economic demands.

The term “Best Agricultural Practice” bases on the equilibrium between economical, ecological and societal demands aimed to enhance sustainability of production systems.

The driving force is the wish to overcome changed external or internal demands and the introduction of a continual improvement system. *Audit* followed by search for possibilities of *improvement*, conceptualised in concrete *plans* and final implementation of innovations move the circle of improvement of production systems up to momentary best practices with momentary equilibrium of satisfied demands (Fig. 1; Alford et al, 2007).

Figure 1: The improvement cycle of Best Agricultural Practice

BAPs have the character of models first and can become common agricultural practice after being evaluated as advantageous for the production system. BAPs demonstrate and

exemplarily realize visions. Important character of BAP is the use of Best Available Techniques (BAT, http://glossary.eea.europa.eu/EEAGlossary/B/best_available_techniques).
Like GAPs the BAPs are specific developments in single segments of on-farm production processes. They are normally not developments for whole product chains, but mutually take into account the demands of stakeholders of the product chain. Tab. 1 provides a comparison of main characteristics of GAP and BAP.

The actors of the self-optimization process are manifold: stakeholders from economy, ecology and society formulate questions and modify demands. Research looks for answers. Authorities evaluate the whole process, often co-ordinate it and integrate new developments to standards supported by consultation.

Summarizing, we propose to use the term “Good Agricultural Practice” only if a catalogue of criteria explicitly defines which procedures commonly accepted by practicians are meant and in which combination. “Best Agricultural Practices” in contrast should characterize the most innovative set of procedures connected with a certain agricultural production process.

Table 1: Comparison of characteristics of GAP and BAP

GAP	BAP
Regulatory instrument	No regulatory instrument
Medium term aims	Future, long term aims
Experience based	Experience and vision based
Minimum agreement	Optimum possible with best techniques available
Aimed to standardization	Supporting the selection of best solution
Common practice	Developed practice of singles
Base for incentives	Base for awards
Base for improvement of agricultural practices	Direction for the improvement process of GAPs
Fixed temporarily in catalogues of criteria	Permanently in flux
Long term change of agreements possible	Impulses for changes of GAPs
Manifold existing standards by GO and NGO	Oriented in a unique holistic standard
Targeted mainly to segments of product chain	Oriented in demands of the whole production chain

Code of Conduct –link between GAP and BAP

“Best Agricultural Practice” tries to optimize the related segments of the product chain. This try builds up a huge amount of existing and site appropriate management guidelines that call for best practices.
The methods of land use which can best achieve the objectives of agronomic and environmental sustainability under specific conditions are perceived as suitable agricultural practice for that location. They can often be generalized on the basis of regional ecological homogeneity or cultural specifics. They are then elaborated as “Codes of Conduct” or “**Codes of Practice**”.

“Codes of Practice” are outlining the responsibilities of or guidelines for an individual or organization, such as a set of principles of corporate behavior adopted by a business.
Codes of practice provide practical guidance and detailed advice on how to achieve a desired standard. Codes of practice are developed through consultation with representatives from industry, workers and employers, special interest groups and government agencies.
If the code of practice of an agricultural company includes the aspect of self-reflection and permanent improvement the link between GAP and BAP is well scheduled.

Several of these codes are already designed by producer organizations (e.g. www.coleacp.org), importers and retailers consortia (e.g. www.brc.org.uk, www.fpc.wa.gov.au/, www.EUREP.org) and Government bodies representing consumers (e.g. UK Food Standards Agency,

www.food.gov.uk/; www.bmelv.de). Many supermarkets have in addition their own codes of practice which their suppliers must satisfy. American retailers use a different standard called SQF 2000 (www.sqfi.com/documentation/ SQF2000_Code.pdf), which is based on Hazard Analysis Critical Control Point (HACCP).

The European Retailers Group (EUREP) is attempting to consolidate the agronomic and environmental components of all these codes into one universal set of rules or guidelines under the name EUREPGAP (= EUREP Good Agricultural Practice). This is intended to present a clear message to suppliers and reduce the confusion that flows from the current multiplicity of codes. The EUREP website (www.eurep.org) sets out the rules and procedures which growers or traders must comply with in order to qualify for EUREPGAP certification. COLEACP and others are also trying to develop a harmonised framework taking the important parts of each code of practice (CAC, 2001).

Other existing Codes of practice are concepts of Good Farming Practice (GFP), Good Plant Protection Practice (GPP, Burth & Freier, 1996, 1999), Integrated Farming Systems (, Integrated Agriculture, Integrated Plant Protection (IPP, Burth et al, 2002), Integrated Crop Management (ICM; Agra CEAS, 2002) and Integrated Pest Management (IPM, Bajwa & Kogan, 2004; www.epa.gov/ pesticides/factsheets/ ipm.htm), guidelines for e.g. zero-tillage production (www.gov.mb.ca/agriculture/crops/ weeds/), agro-ecological practices, permaculture, organic agriculture, bio-intensive farming, holistic management (FAL, 2003), and practices that improve agricultural biodiversity, address workers rights, access to resources, optimizing the use of locally available resources by combining different components of the farm system; reducing the use of off-farm,

external, non-renewable inputs; improving the match between cropping patterns and productive potential, working to value, conserve biological diversity, taking full advantage of local knowledge and much more aspects (EC, 1991, 2000a, 2000b; for more links see www.feldmann-lifesciences.de).
All stakeholders of agricultural practices established these Codes of Practice for guarantying GAPs and improvements of BAPs.

Stakeholders in Implementation of BAP

Governments have encouraged cooperation among diverse stakeholders at the local and national levels for effective programme and policy design as well as implementation of GAP. Representatives of consumer groups and retailers, processors, producers, and service providers from the private sector, civil society and government may have divergent interests and stakes in GAP (Figure 2 provides an example for officially accepted counterparts in case of plant protection concerns in Germany, www.bmelv.de).

The BAP approach must take into account the views and priorities of these different stakeholders whose involvement spans the product chain to enhance awareness, exchange information and build consensus on the way forward.
Putting BAP into the GAP approach as an integral part will require attention to mechanisms and processes for engaging those diverse stakeholders who are already well integrated into the dialogue while building the skills and capacity in process and practice of more marginalized groups whose presence has been less evident.

Capturing lessons learned, sharing information, raising awareness and enhancing skills and capacity are important elements to advance the development of the BAP approach. These elements apply at varying levels to farmers and producers, to institutions that provide agricultural services including research and extension, and to retailers, processors and consumers (FAO, 2004).
Capacity building efforts must be put in place to assist producers in transitioning from their agricultural practice to GAP and further on to implement the BAP approach in their Code of Practice.

There is an important role for national governmental organizations to play in providing coordination and guidance in the preparation of educational materials or providing workshops with farmers to build upon existing GAPs, assist in clarifying GAPs and integrating the BAP self-optimization procedure within the landscape of regulations, certifications and market requirements (both national and international), provide information on implementing relevant GAPs and build capacity for certification. Farmers who have achieved success in implementing GAPs, Codes of Practice and BAPs are an important resource for the transition to sustainable agriculture.

These efforts can build upon the abundance of such information in the National Agricultural Extension Services, international and local non-governmental organizations, and commodity producer organizations. Improving the capacity of extension services and agricultural service providers from government and non-governmental organizations will be of continued importance.

Figure 2a: Non-Governmental stakeholders for plant protection concerns in Germany (Risk Reduction Programme, 2007)

Figure 2b: Governmental stakeholders for plant protection concerns in Germany (Risk Reduction Programme, 2007)

The development of a GAP and BAP approach must include a strategy for building knowledge and capacity of, and information exchange among the broad range of stakeholders.
It is of crucial importance to build up networks including science as relevant partner for the creation of innovative developments. In Germany, e.g. the German Phytomedical Society fits into these goals (www.phytomedizin.org; www.feldmann-lifescience.de).

Obviously, the GAP approach in combination with the BAP approach might be a way to address goals of sustainable agriculture and rural development through technical, voluntary, and non-regulatory practices.
Of course, it needs to be validated for application in different settings with respect to production systems, agroecozones, and the roles and requirements of different stakeholders. Pilot projects can be implemented to provide the means of translating and adapting management guidelines for relevance to local conditions.

The success of the GAP and BAP approach lies in its continued engagement of the multiple, relevant stakeholders (producers, consumers, retailers as well as those institutions and services that support GAP through research, education, and extension). Stakeholder dialogues and round-table discussions, conferences and scientific symposia at the regional, national and international level on the full spectrum of BAP or BAP related specific agricultural components can be an important avenue for information sharing, refining indicators and practices, and improving the approach (Fig. 3).

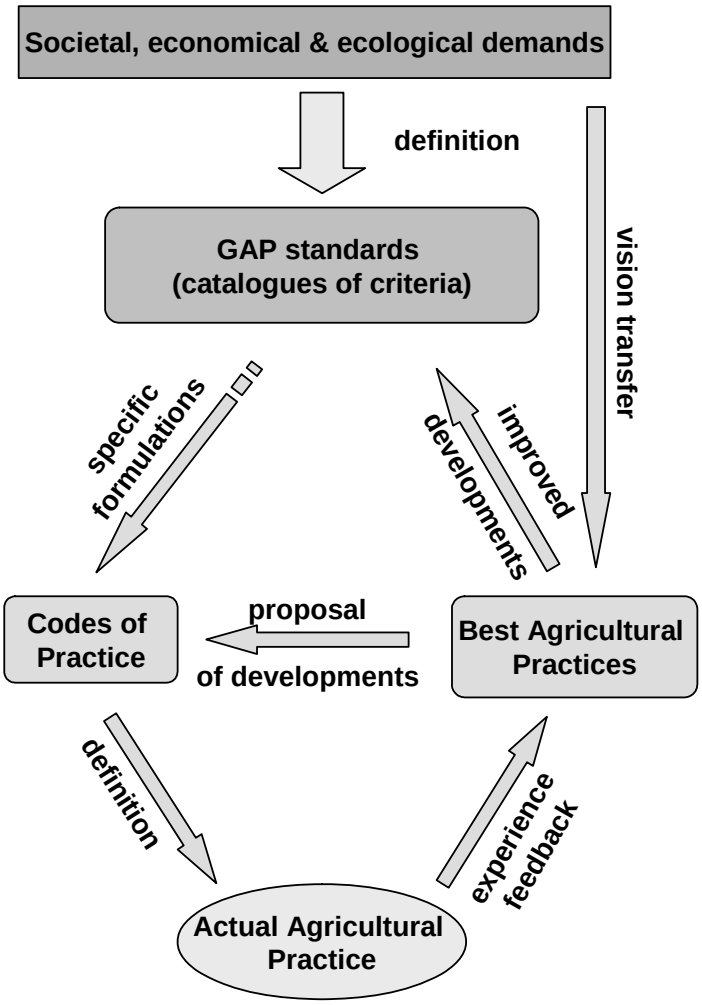


Figure 3: The dynamic BAP concept of self-optimization

Information supply chain

Agriculture is expected to assure especially food security in a range of settings, now and in the future, and is increasingly called upon to reduce negative ecosystem impacts while producing environmental, social and economic benefits.

Many factors, including technology, social and economic developments, associated government policies and programs affect attainment of agriculture development goals. These factors are conditioned by globalization, which is progressively changing how and where food and farm products are produced, processed and traded (compare EC, 2003c).

Consumer concern is growing in all parts of the world over sustainability, public health implications and safety of agricultural practices and products. *Processors* and *retailers* are matching anticipated market demands with the available supply of products. *Farmers*, as producers of agricultural products, are provoked to get the capacity to make new farming and technology choices to increase productivity and conserve resources while meeting demands for a safe and healthy diet in response to new regulations and standards, changing global consumption patterns, improved market access and potential value-added opportunities (FAO, 2004). Farmers also are called upon to provide environmental services. Finally, *governments* provide the enabling policy and the regulatory framework particularly concerning product safety, agricultural production and trade, while seeking to meet product security and sustainability objectives.

All these stakeholders are connected by the **Supply Chain**. The raw material produced by the farmer is transported step by step from one stakeholder to the other, in case of food along the chain from “farm to fork”. Together with the product

information about that product is transferred: the resulting chain is called **Information Supply Chain**. The Information Supply Chain helps achieving business objectives by elucidating critical business processes (Marinos, 2005). It is the medium to establish transparency and to create trustfulness on guarantees.
The basis for correct information is the data reliability of the informant often furthered by independent certifications of quality control. Supply chain together with the information supply chain is called **Product Chain**.

The agricultural production practice realized on a farm, whether performed as GAP or BAP, with or without written Code of Practice, is the basis for the quality of the whole subsequent product chain. Developments of GAPs via BAPs, therefore, should be oriented in the aims of Agenda 21, i.e. in the continual enhancement of sustainability of product chains.

Production Quality

The most useful instrument for evaluation and handling of the current performance of all activities along a product chain is the assessment of **production quality** (Beamon, 1999).
The term „production quality" bases on a products life cycle (Fig 4) and on the assessments of product impacts on all components of the product chain inclusively unwanted side effects. Production quality summarizes the quality of segments certified by specific catalogues of criteria (Fig 4), e.g. GAPs for on-farm production.
The implementation procedure and the continual assessment of production quality are sometimes called "Total Quality Management" (e.g. www.sources.de).

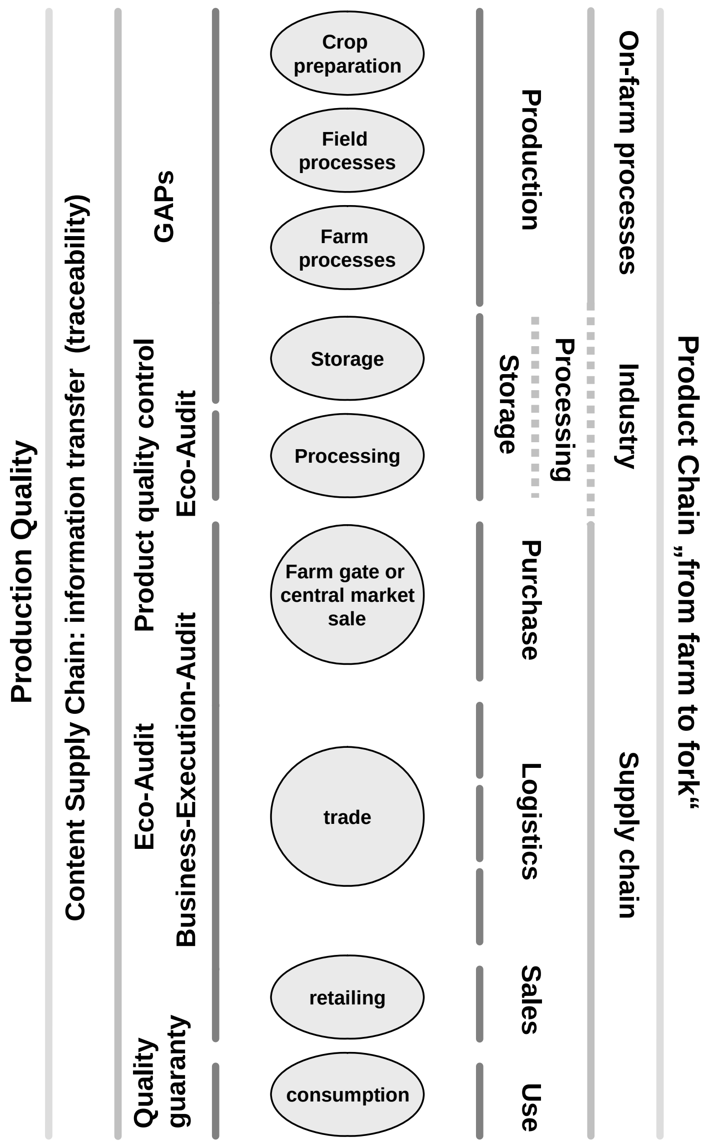


Figure 4: Product Chain and related quality control segments including GAP descriptions for on-farm production

The term “**management**” in several combinations indicates the act of directing people towards accomplishing a goal.

Summing up segment evaluations production quality is considering several international commitments related to the performance of agricultural and trade/business practices.
The overall agreement is that agricultural products should try to be produced as sustainable as possible. That means that all practices must be profitable as well as “socially and culturally suitable" (FAO, 2004). Furthermore, agricultural practices and subsequent processes along the product chain have to meet the requirement of ecological sustainability. From the production quality assessment, therefore, the potential sustainability of a specific product chain can be deduced (see below).

The commitments reflect the demands of several interest groups along the product chain including the producer with his employees, producer associations, individual retailers, retailer organizations, supply-chain driven systems, industry and – last not least - the consumers.
Their specific interests can be summarized in three main fields: societal demands, environmental demands and economic demands. Consequently, Meier (2002) asked for “social, environmental and economic compatibility” of production systems with “cultural compatibility as the central dimension of sustainable development”.

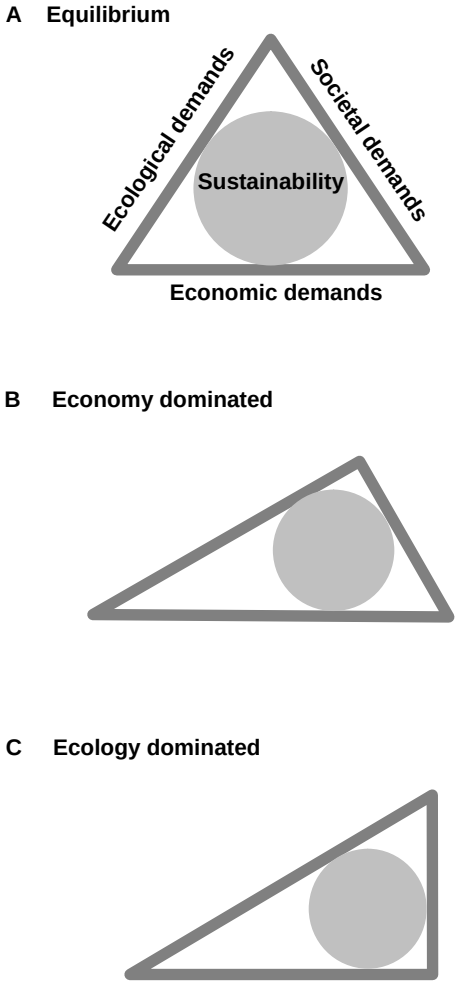


Figure 5: Interrelationships between economical, ecological and societal demands and sustainability of agricultural production systems

Societal demands (including e.g. social, sociological or cultural components), environmental demands (including aspects of e.g. soil, water, air, biodiversity or landscape protection) and economic demands (including e. g. healthy food for all and not restricted to those who can pay high prices) are in direct relationship to each other (Fig. 5). High prices influence societal demands, societal demands may lead to high prices, both may influence environmental demands and vice versa.

On that background, it is easy to demonstrate how those fields of demands influence sustainability (Fig 5): a circle within the triangle touching each side in one point differs in size when the length of the triangle sides change. The size of the circle serves as a measure for sustainability. In case of satisfaction of all demands an equilibrated, equilateral triangle develops with momentary optimal sustainability.

Basing on the requirements following from Agenda 21 the term “production quality”, can be described as a “combination of production factors resulting in a certain, temporary value of sustainability of the related product chain”. Because of the determination of sustainability by the sets of variables and factors, logically, aspiring higher sustainability is passing lack of equilibration in the triangle model between the fields of demands demonstrating the fields of necessary actions (Fig. 6).
Here, we propose a very easy definition for sustainability in practice: sustainability should be understood as the length of the time period of unchanged use of factors with a certain level of production quality. This interpretation summarizes traditional characteristics of sustainability (e.g. the reaction norm to stress) with stability of productivity, trade and consumer aspects.

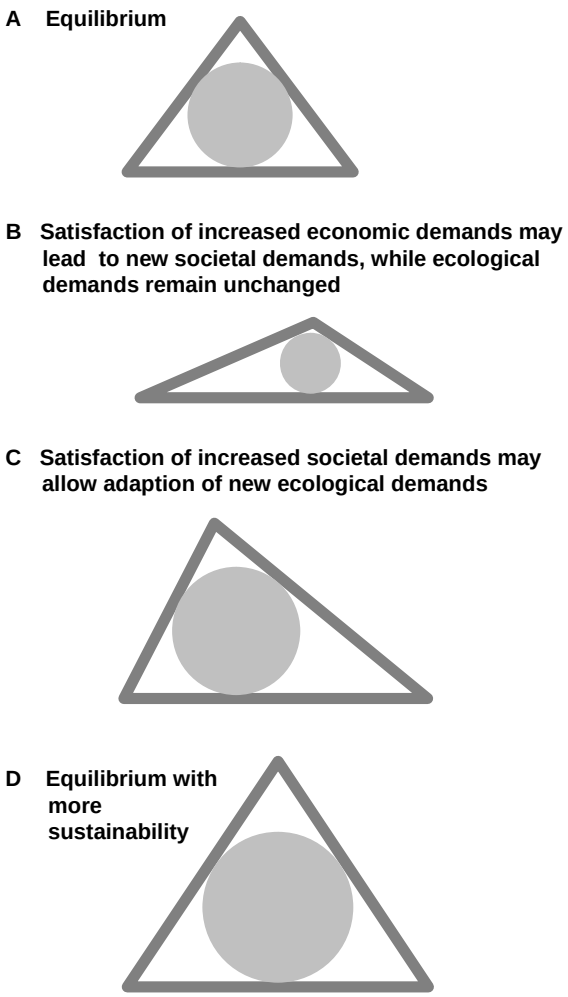


Figure 6: Aspiring higher sustainability may be the driving force to overcome specific demands (here exemplarily changed societal demands) by mutual collaboration of stakeholders

Best management for sustainability of agricultural product chains

In business, overall direction to the enterprise is provided by strategic management. Strategic management is the process of specifying an organization's objectives, developing policies and plans to achieve these objectives, and allocating resources to implement the policies and plans to achieve the organization's objectives. It is the highest level of managerial activity (Marinos, 2005).

Strategic management for agricultural product chains would be very useful for the process of self-optimization in order to enhance production quality. But, in practice, there is nearly no distinct “monadic” chain of agricultural products. Behind the farm gate the raw materials are mostly used for a lot of different end products leading to a kind of “product network”.

As a consequence, for each segment of a product chain management strategies were formulated for realization of interests of single stakeholders. The result of negotiations along the product chain including realizations of Good or Best Agricultural Practices decisively depends on the social responsibility of all stakeholders. As shown above, only *mutual* co-operation leads to enhancing sustainability (Fig. 6). For instance, trade should have the ability to rely on agricultural practices following their demands, farmers should have the ability to count with receiving the price it costs fulfilling these demands, and for the consumer it should be transparent how a product has been produced and traded. The consumer on the other hand should respect that good quality products cannot be produced sustainably for cheap prices. While the GAP/BAP approach guarantees transparency and traceability for on-farm

production, internal business executive audits like diverse business ethics assessments exist checking the quality of trade and retailing agricultural products (Beamon, 1999). We call the management *best* if the performance considers the demands of all segments along the product chain and acts in that sense "emphatic".

With respect to strategic management of product chains of agricultural products the exchange points between segments of a product chain offer the possibility to document and to evaluate the quality and reliability of information transfer by independent institutions. Here, possibly we will find a basis for recommendations to stakeholders which direction they should choose to increase the production quality and to enhance the sustainability of the related product chain.

Fundamental tools to achieve sustainability in product chains

For the management of agricultural product chains there are several assessments available which can be used as direction tools like for industrial products to describe its impact on components of the product chain.

The **product quality** assesses whether a product is 'fit for purpose'. This means the product must meet or exceed the customer requirements. It is important to remember that it is the customer who sets the "quality standards" in terms of their overall expectations of quality. There are several ways that a customer may define quality of agricultural products: freshness, appearance, safety, functionality, nutritional value or others. It

should be noted that a good quality product does not necessarily have to be an expensive product; it merely has to fulfill its purpose within the eyes of the customer. Nevertheless, the consumer should receive more information about agricultural production to develop better understanding for adequate pricing.

The **Socio-Economic Impact Analysis** examines how a proposed product will probably be accepted by current and future consumers. Here, the consumers demands are measured: e.g. quantitative aspects because of changes in community demographics, results of retail/service and housing market analyses, changes in demands for public services, changes in employment and income levels and changes in the aesthetic description of product quality by the consumers. This analysis can be of special importance when planning plantations of perennial plants and mixed cropping systems (Feldmann et al., 1995).

Within the product chain **Health Risk Assessment** and **Environmental Risk Assessments** are very important. Risk assessment is a step in the risk management process. Risk assessment is measuring two quantities of the risk, the magnitude of the potential demage, and the probability that the demage will occur. These assessments have a look especially on plant protection procedures or waste management.

Life Cycle Assessment (LCA) is a quantitative method used to measure the energy and material flows associated with all stages of a product from farm to fork. The application of this LCA to agricultural and food production processes is beginning to increase. LCA recently is a tool used to evaluate mainly the

potential environmental impact of a product, process or activity throughout its entire life cycle by quantifying the use of resources ("inputs" such as energy, raw materials, water) and environmental emissions ("outputs" to air, water and soil) associated with the system that is being evaluated.

The **Cost/Benefit Analysis** process involves monetary calculations of initial and ongoing expenses vs. expected return. In practice, analysts try to estimate costs and benefits either by using survey methods or by drawing inferences from market behaviour. Cost-benefit analysis attempts to put all relevant costs and benefits on a common temporal footing. During cost-benefit analysis, monetary values may also be assigned to less tangible effects such as the various risks which could contribute to partial or total project failure; loss of reputation, market penetration, long-term enterprise strategy alignments, etc. Adequate pricing will be of special importance for the sustainability of agricultural product chains in the future.

The **Business Ethics Assessment** determines and evaluates the fundamental purpose of a company. Along the agricultural product chain a company's main purpose within the discussed product chain should *not* be to maximize the returns to its shareholders not considering the interests and rights of anyone else (shareholder concept). The evaluation of existing ethical rights and duties between companies and society should clearly demonstrate the Corporate Social Responsibility of a company respecting the demands of other stakeholders along the product chain (“mutual” stakeholder concept). Issues regarding the moral rights and duties between a company and its shareholders becomes clear when the fiduciary responsibility and the

stakeholder concept vs. shareholder concept of a company is evaluated.
All these instruments are already available and the most important strategic component would recently be for each stakeholder to demonstrate clearly which information he already transfers at the exchange points of the product chain to the next chain link partner. This finally results in a traceable information supply chain with the consequence of reliability of the whole product chain as a basis for its sustainability.

Core Characteristics of Sustainability of agricultural product chains in the future

From a strategic management point of view enhancing sustainability is the main goal for the development of integrated agricultural product chains. For the quantification of sustainability (i.e. the length of the triangle sides, Fig. 6) already several relevant, reliable, quantifiable indicators are available (see e.g. www.sustainabilityindicators.org):
As economic indicators of sustainability are used: return on investment, exit/entry ratios, flexibility of the production system and by-product utilization. Social indicators of sustainability are consumer's willingness to pay for sustainable products, social equity/community inclusion of agriculture, quality of life for farming families, share of disposable income of consumers spent on food. As environmental indicators of sustainability use of renewable resources relative to total resource use, tons of soil erosion per unit of production, earthworm and microbial activity per acre, share of open-pollinated plants relative to hybrid and genetically modified varieties, balance between the number of

animals on the land and ability of land to use nutrients are available.
Indicators should reflect a vision of agriculture which fulfills specific core characteristics (based on Beets, 1990, Fig. 7).

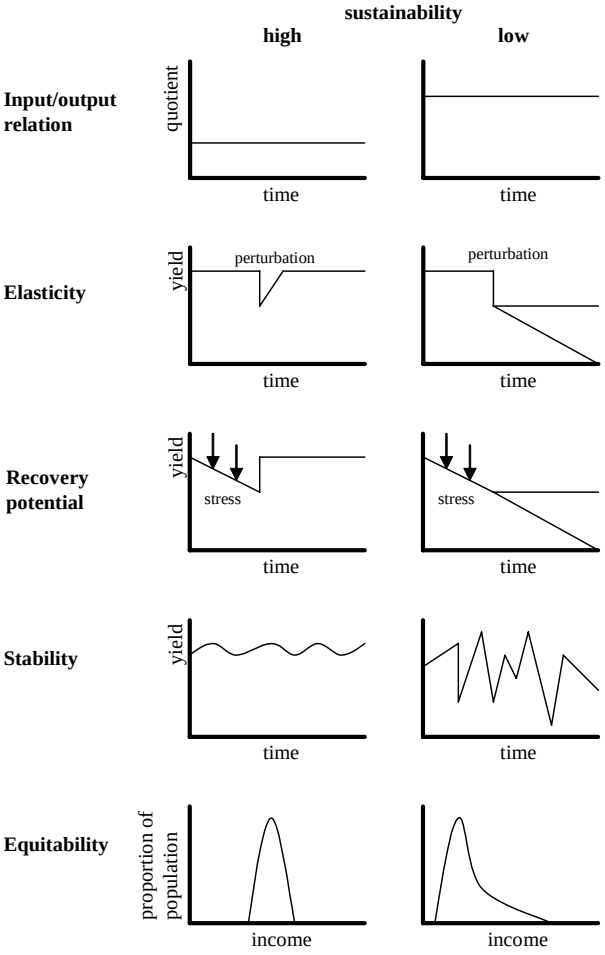
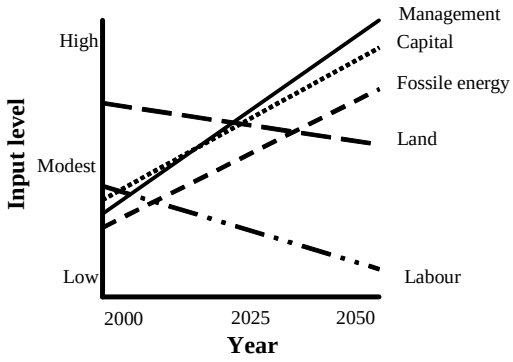
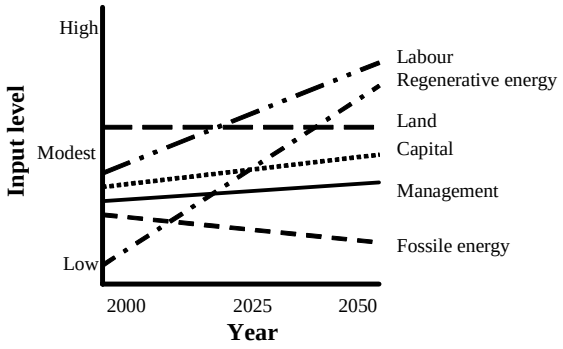


Figure 7: Core characteristics of high and low sustainability of agricultural production systems (based on Beets, 1990)



A **Provisional development of important input levels extrapolited from recent use of resources**



B **Proposed development of important input levels with responsible use of resources**

Figure 8: General use of resources in agriculture (modified, after Beets, 1990)

With a relatively moderate input the output should be moderate to high while respecting environmental demands. The economic output of a farm should have the ability to react elastic to perturbations by environmental or economical disasters. After longer lasting stresses caused by diverse reasons the farm should recover from that stress without loosing its production potential. Such characteristics should afford stable income and allow in case of high social responsibility adequate salaries (Fig. 8).

A responsible use of resources, including the human potential "labor", supports the sustainable direction of rural development:
The recent concentration of farms to larger and larger ones, combined with increasing mechanization destroys huge amounts of jobs especially for people with no or low school degrees. This interferes with societal stability. More jobs in agriculture for fair salaries are a societal demand in the future. Providing more jobs slightly increases inputs for management and capital.
Best Agricultural Practices including Best Techniques Available will maintain or even increase the productivity of farmland. Modern agricultural production systems will depend on higher inputs of energy. This energy should be produced from renewable resources and not longer from fossile sources.

Conducted by these ideas the Best Agricultural Practice Concept will define the way for decision makers to look for solutions which can be transferred into Good Agricultural Practice Standards and be applied as common agricultural practices in the future.

REFERENCES

Agra CEAS Consulting (2002): Integrated crop management system in the EU. Amended final report for European Commission, DG Environment

Alford, D.V, Feldmann, F., Hasler, J., Tiedemann, A. v.: Best Practice in Disease, Pest and Weed Management, BCPC, ISBN: 978-1-901396-82-9, pp 144

Bajwa, W. I., Kogan, M. (2004): Compendium of IPM Definitions (CID): A Collection of IPM Definitions and their Citations in Worldwide IPM Literature. http://www.ippc.orst.edu/IPMdefinitions/defineIII.html#90's

Beamon, B. M., (1999): Measuring supply chain performance. International Journal of Operations & Production Management, 19(3) 275-292

Beets, W.C. (1990): Raising and Sustaining Productivity of Smallholder Farming Systems in the Tropics; AgBe Publishing, Alkmaar, NL. ISBN: 974 85676 1 3

Burth, U. and Freier, B., 1999: Gute fachliche Praxis im Pflanzenschutz. Nachrichtenbl. Deut. Pflanzenschutzd. 51 (1), 5 - 8

Burth, U. und Freier, B., 1996: Zur Entwicklung von Inhalt und Begriff des integrierten Pflanzenschutzes. Nachrichtenbl. Deut. Pflanzenschutzd. 48(1), 10-13

Burth, U.; Freier, B.; Hurle, K., Reschke, M.; Schiller, R.; Stein, B.; Westphal, D., 2002: Die Grundsätze des integrierten Pflanzenschutzes. Nachrichtenbl. Deut. Pflanzenschutzd. 54, 208-211

CAC (2001): Guidelines for the Production, Processing, Labelling and Marketing of Organically Produced Foods.

Codex Alimentarius Commission (CAC), CAC/GL 32.1999, Rev. 1-2001, Point 7, Rome, Italy

EC (1991): Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources. Official Journal L 375, 31/12/1991 P. 0001 – 0008, Brussels, Belgium

EC (1999a): Council Regulation (EC) No 1257/1999 of 17 May 1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF) and amending and repealing certain Regulations. L 160/80, Official Journal of the European Communities, 26.6.1999, Brussels, Belgium

EC (1999b): Directions towards sustainable agriculture. Communication from the Commission to the Council; the European Parliament; the Economic and Social Committee of Regions, COM (1999) 22 final, Brussels, Belgium

EC (2000a): Indicators for the Integration of Environmental Concerns into the Common Agricultural Policy. Communication from the Commission to the Council and the European Parliament, COM(2000) 20 final, Brussels, Belgium

EC (2000b): Organic farming guide to community rules. European Commission, Directorate-General for Agriculture, Luxembourg

EC (2003a): Council Regulation (EC) No 1782/2003 of 29 September 2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers and amending Regulations (EEC) No 2019/93, (EC) No 1452/2001, (EC) No 1453/2001, (EC) No 1454/2001, (EC) 1868/94, (EC) No 1251/1999, (EC) No 1254/1999, (EC) No

1673/2000, (EEC) No 2358/71 and (EC) No 2529/2001. Official Journal of the European Union, L 270/1, 21.10.2003

EC (2003b): Proposal for a Council Regulation establishing common rules for direct support schemes under the common agricultural policy and support schemes for producers of certain crops. European Commission, Brussels, Belgium

EC (2003c): EU fundamentally reforms its farm policy to accomplish sustainable farming in Europe. EU Institutionspress release, IP/03/898, 26.06.03, Luxembourg

EPPO (2000): EPPO Standards: Guidelines on good plant protection practice, Potato PP 2/2(2) English. European and Mediterranean Plant Protection Organization (EPPO), Paris, France

EPPO, 1994: Guideline on good Plant Protection Practice. EPPO Bulletin 24, 233-240

EUREPGAP (2001): EUREPGAP Protocol for Fresh Fruit and Vegetables, Euro-Retailer Produce Working Group (EUREP), Köln, Germany

FAL (2003): Good Farming Practice – definitions, implementation, experiences; Report on the results of work package 2 within the EU Concerted Action "Developing cross-compliance in the EU – background, lessons and opportunities", including an European seminar 2 – 3 June 2003. Federal Agricultural Research Centre (FAL), Institute of Farm Economics and Rural Studies, Braunschweig, Germany

FAO (2004a): Terms of Reference: Expert Consultation on Good Agricultural Practices 10-12; November 2003. Food and Agriculture Organization of the United Nations (FAO), Rome, Italy, website: http://www.fao.org

FAO (2004b): Terms of Reference: Expert Consultation on Good Agricultural Practices 10-12 November 2003. Food and Agriculture Organization of the United Nations (FAO), Rome, Italy, website: http://www.fao.org/prods/GAP/gaptors_en.htm

Feldmann, F., Gasparotto, L., Lieberei, R., Preisinger, H., 1995: Utilizacao de areas abandonadas na Amazonia com policultivo de plantas perenes uteis
In: Kanashiro,M, Parotta, J.A. (eds): Manejo e reabilitacao de areas degradadas e florestas secundarias na Amazonia; USDA, Puerto Rico, USA, S. 46-56

Gündermann, G., 2005: Rechtsverbindlichkeit der guten fachlichen Praxis im Pflanzenschutz. Nachrichtenbl. Deut. Pflanzenschutzd. 57,224-227.

Marinos, G., 2005: The Information Supply Chain: Achieving Business Objectives by Enhancing Critical Business Processes, DMReviews, 04-2005, http://www.dmreview.com/article_sub.cfm?articleId=1023896

Meier, U., 2002: Controlled agriculture according to ethical-ecological criteria of crop growing. Proceed. XV Reunión International ACORBAT, Cartagena Meeting. 552-556

PAN, 2004: Moving towards Pesticide Reduction realizing Best Agricultural Practice in Central and Eastern Europe, Self-published, ISBN: 3-9809392-4-3, pp 31

Redman, M, 2003: A Draft Concept for Best Agricultural Practice (BAP) in the DRB. In: UNDP, 2003: Policies for the Control of Agricultural Point and Non-point Sources of Pollution, 7-8

Reschke, M., Bötger, H., Ripke, F.O., 1987: Gute fachliche Praxis im Pflanzenschutz. Gesunde Pflanzen 39(12), 497-509