Organic Fruit Production in Europe

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PART I: SHORT HISTORY OF ORGANIC FARMING

The organic fruit production in Europe is not only a matter of statistics, regulations and tables but also has a meaningful historical background. So as an introduction, we can take a brief excursion back to the roots and the evolution of organic farming. (The following text is closely—but not entirely—based on an overview article of Gunter Vogt, 2000a.)

Organic farming's origins in the first decades of the 20th century need to be understood in the context of five main aspects:

1. Since the end of the 19th century the "Life Reform Movement" (in German =*Lebensreform-Bewegung*) existed disapproving industrialization, urbanization and mechanization of the modern world. They called for a "natural way of living" including vegetarian nutrition, physical training, natural medicine and "back-to-the-country" movement.

   During the first and second world war there was a state of crisis in agriculture and agricultural science due to a dramatic loss of yield level (in spite of increased use of mineral fertilizer). Farm business suffered from economic problems with indebtedness, compulsory auctions and a decline of rural tradition and lifestyle. Furthermore, ecological problems appeared that had not been seen earlier such as breakdown of soil structure and soil fertility, decline of seed quality, increasing problems of plant diseases and pest infestations and, finally, diminished food quality as a consequence of the intensified nitrogen fertilization.
2. In the early 1900s a new agricultural discipline appeared: the biologically oriented agricultural sciences discovering, for example, nitrogen fixing bacteria. Among others Felix Löhnis, Lorenz Hilter and Raoul H. Francé investigated the ecology of soil organisms and developed a biological concept with soil fertility in its center.
3. Holistic views of nature with concepts of scientific-ecological and scientific-spiritual formed the background of organic farming.
4. Finally, farming cultures of the Far East with their highly developed sustainability served as examples to develop organic farming including composting and recycling of municipal organic waste.

. . . organic agriculture is the only growing sector of agriculture. . . . Most European countries give subsidies to stimulate and to support organic production . . . .

ORGANIC FARMING IN GERMAN SPEAKING COUNTRIES

Natural Agriculture

Parts of the (initially) urban "Life Reform Movement" tried to realize their ideals working as farmers and gardeners. The concepts of Natural Agriculture included vegetarianism, healthy nutrition, farming without animals and a scientific (biological) understanding of soil fertility. Soil cultivation included rotting and mulching techniques, conservation tillage, green manuring, rock powder fertilization, assessment of organic matter cycling, recycling concepts for municipal wastes and human feces (Könemann, 1931, 1932, 1937).

Founded in 1927/28 the Association "Natural Farming and Back-to-Land" (*Arbeitsgemeinschaft Natürlicher Landbau und Siedlung*) developed standards for organic farming, created a trademark and was engaged in marketing as well as in training and advisory activities (Fig. 1).

Biodynamic Agriculture

The second source of organic farming had been Rudolf Steiner's "Agricultural Lectures" (*Landwirtschaftlicher Kurs*) held at Koberwitz in 1924. The concepts of Biodynamic Agriculture are derived from Anthroposophy, at its roots an esoteric-occult world view. Nature is conceived as a spiritual-physical matrix. The key concept presented by Rudolf Steiner was the farm as a living organism and individuality characterized by "ego forces." Thus he suggested an intimate personal relationship to nature forming the basis of farming.

The development of biodynamic agriculture was centered in provinces of former eastern Germany during the '20s and '30s. The present day worldwide well-known trademark Demeter was created in 1929/30. Aiming for a holistic view of nature, farming and science were and still are a central theme.

RESEARCH INSTITUTE OF ORGANIC AGRICULTURE (FIBL, IN GERMAN = *FORSCHUNGSINSTITUT FÜR BIOLOGISCHEN LANDBAU*)

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In 1974, the Research Institute of Organic Agriculture (FiBL) was constituted as a private foundation by organic farmers, scientists, politicians and representatives of industry near Basel (Switzerland). It has set itself the task of establishing practice-oriented agronomic and economic research and of making new findings available to the organic farmers. Today the institute has about 90 employees; there are three research departments and a department for advice and training.

Although a private foundation, FiBL is considerably funded by the federal government, the Swiss cantons and private institutions as well as by revenues from planning and advising. Currently its annual revenues in research are 4.5 million Euros and in training and extension 1.5 million Euros.

The research activities of FiBL are organized in the following departments and groups:

- Soil and Plants Department with groups Soil Ecology, Crop Production and Crop Quality, Plant Protection, BioGene.
- Livestock Department with groups Animal Health, Animal Husbandry and Breeding, Parasitology.
- Landscape, Economics Department with groups Landscape and Biodiversity, Socio-Economics and Standards.

Organic-Biological Agriculture

In the '50s and '60s the "Swiss Farmers' Movement for a Native Rural Culture" (*Schweizer Bauern-Heimatbewegung*) searched for alternatives to the industrialization of farming which would save a rural way of living in the modern world. Initiated by their leader Hans Müller and especially his wife Maria Müller, the farmers developed an original ecological farming practice. Organic-biological agriculture was characterized by ley farming (mixed livestock and pasture), sheet composting and conservation tillage. They acquired traditional techniques, the knowledge of Natural Agriculture, Anglo-Saxon organic farming and partly experiences of Biodynamic agriculture. Hans Peter Rusch's concept of nature as "Cycle of Lively Particles" (*Kreislauf lebendiger Substanz*) and his soil test provided the theoretical background. For the marketing, grower cooperatives were founded and they still exist. The organic-biological movement is an example of a successful, strongly farmer-driven initiative.

Last but not least, the energy and "drive" of both the biodynamic and the organic-biological movements in Switzerland led in 1974 to the foundation of the private Research Institute of Organic Farming (*Forschungsinstitut für Biologischen Landbau, FiBL*) near Basel in Switzerland. Today FiBL is the largest research institute in the world for organic agriculture with about 90 employees. Also in Switzerland, at Sissach, the first international congress of IFOAM (Int. Federation of Organic Movements) was held in 1977.

Biological and Ecological Farming

The "Natural Agriculture" of the '20s and '30s was followed by two predominantly practical and science-based ecological farming systems: Biological Agriculture in the '50s and '60s and Ecological Agriculture in the '80s and '90s. Both systems partly abandoned some principles of the Life Reform Movement (e.g., farming without animals). They incorporated new knowledge of science, e.g., rhizosphere dynamics, systems ecology, etc. They developed ecological technologies and methods of plant cultivation and animal husbandry. In Germany in 1988 several associations joined together in the AGOEL umbrella organization. Similar organizations are Bio-Suisse in Switzerland and Ernteverband in Austria. The European Union (EU) set the legal basis of organic farming, food processing and labeling with the Ordinance 2092/91 in 1991 (EEC, 2000).

Beside organic standards of single states, label organizations, the EU and IFOAM, in the late '90s also FAO and WHO have set, in form of the so-called "Codex Alimentarius" standards and definitions on organic produce (FAO/WHO, 1999). These standards are particularly important for worldwide trading and WTO agreements.

Organic Farming in the United Kingdom and in the USA

The development of organic farming in these countries is based on a similar context of origin: vegetarian food reform and back-to-the-land movement, scientific-biological concept of soil fertility (Sir Albert Howard, Selman A. Waksmann), declining soil fertility (Dust Bowl, neglected humus economy), decreasing food quality (Sir Robert McCarrison), a holistic view of nature and farming cultures of the Far East (Franklin H. King).

The main impulse for organic farming in Great Britain and in the USA was the work of Sir Albert Howard in India on plant breeding, plant health, composting ('*Indore process*') and recycling of municipal organic waste. He also emphasized that agricultural research should always take into account the whole farming system rather than relying on partial interventions.

In 1943 Lady Eve Balfour founded the "Soil Association," which still exists, and initiated the Haughley Experiment to compare scientifically different farming systems. Further pioneers of British organic farming were Newman Turner and Friend Sykes (humus farming) and Sir George Stapledon (grassland cultivation).

In the United States the "Friends of the Earth," a group of scientists and politicians, aimed to broaden an awareness of ecological problems, especially the Dust Bowl and other soil-related problems. They published the journal *The Land*. Edward H. Faulkner and Louis Bromfield proposed a sustainable soil cultivation based on sheet composting, a "trash mulch system" combining green manuring and conservation tillage. A spokesman of the organic farming movement became the publisher J. I. Rodel of the journal *Organic Farming and Gardening.*

Organic Farming in France and Japan

In France organic farming was established only during the '60s, based on concepts that are comparable to the German and Anglo-Saxon science-based organic farming. The still active pioneer was Claude Aubert and the association "Nature et Progrès." Fertilization and soil improvement with sea weeds are essential elements in the method "Boucher-Lemaire."

In Japan an environmental and consumers' movement, not agriculture itself, initiated organic farming at the end of the '60s. Urban consumers demanding healthy food founded cooperatives to link producers and consumers. These arrangements between households and farms—called "teikei," meaning partnership—include buying the whole harvest and working personally on the farm and thus learning from each other.

Conclusions

The main principles, elements and driving forces of organic farming are similar and surprisingly stable almost from the beginnings of organic agriculture, 100 years ago. With some simplifications they can be summarized as follows:

- Being able to farm without synthetic agrochemicals and, for the future, without genetically modified organisms.
- Biological understanding of soil fertility and cultivation—to build up and maintain high soil fertility.
- Farming by using ecological interactions—to maintain natural cycles and processes that are as closed as is feasible, to promote and conserve biodiversity.
- To keep, feed and breed livestock, respecting ethical principles.
- Producing high quality food with a holistic view of quality including aspects of sensory, health, environment and social fairness.
- Scientific knowledge but also philosophical approaches and farmer experiences as starting points, backgrounds and driving forces of development.
- An alternative way of living including visions of a "new" society.

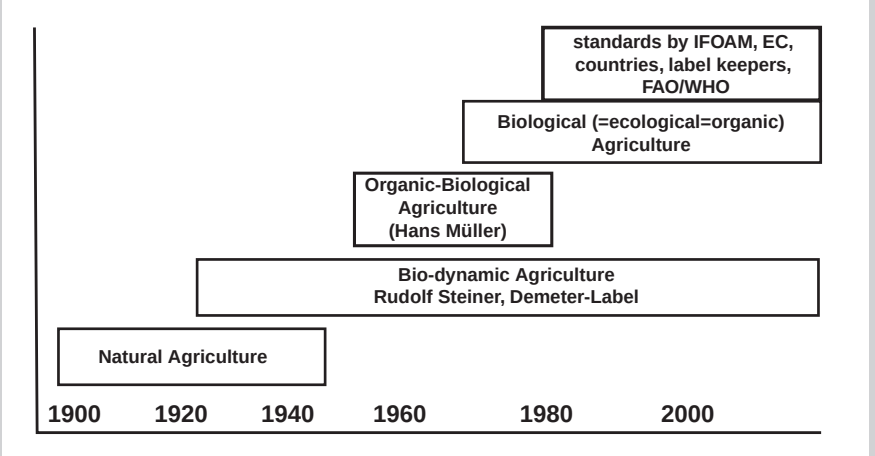
Today a worldwide professionalization of the organic farm business can be observed. This is reflected not only by the turnover of goods and money with organic produce but also by the increasing number of standards, ordinances, certification offices, research activities, etc.

In the context of decreasing confidence of the consumers, mainly in the industrialized countries, toward the conventional farm business and the increasing need to preserve biodiversity, intact landscapes and sustainable land use it is no wonder that organic agriculture is the only growing sector of agriculture.

Beside the ongoing task to find technical improvements, an important challenge of the future certainly will consist of forming the production and market expansion in a sustainable way without losing the high credibility of the technical *and* the ethical values of organic agriculture.

FIGURE 1

Evolution of organic farming systems/concepts in German-speaking countries.



PART II: ORGANIC FRUIT GROWING IN EUROPE IN THE BEGINNING OF THE 21ST CENTURY

Production Area and State Subsidies

At present time, organic fruit production is biggest in southern Europe and France (Table 1). In southern Europe countries predominantly olives, grapes, dry fruit and apples are grown. In Greece organic production has not become an important trend yet. The organically cultivated area is probably largest in Italy. Accurate surface data are known for South Tyrol with 540 ha of intensive organic table fruit production. However, for the south of Italy information is somewhat unclear (Lindhard and Callesen, 1999). A situation of boom occurs in France where 42% of the organic fruit area was in transition in 2001. Such an intensity of production growth certainly needs very careful preparation on the marketing side in order to prevent unexpected surprises with the selling and the price of the produce.

In central and northern Europe the area grown with organic fruit and berry is less than 500 ha (1235 acres) per country. Germany is an exception having almost 1000 ha (2471 acres). Apples and strawberries are the most important species. For the northern countries it is very difficult to find how extensive the production is because high amounts of the production are sold directly in farm shops.

Most European countries give subsidies to stimulate and to support organic production with Sweden as an exception. Mostly this amount is between 400 to 850 Euro (1 Euro = 0.9 $US) per year and ha. The Netherlands spend the highest subsidies with 11,344 Euro per ha per year during the first 5 years. The differences between the countries are substantial. In general, however, for fruit farms these subsidies are far too low to compensate for the necessary investments and the economic risks or losses during the transition period. Thus for the fruit growers, good farmgate prices for the product and good market perspectives are and will remain the decisive reasons to convert to certified organic production.

Standards and Permitted Products for Organic Fruit Production

The minimal legal standards for organic farming in Europe are drawn up in the European ordinance 2092/91 (EEC, 2000). Since 2000, it has been completed with detailed regulations on organic animal husbandry. Switzerland has an ordinance on its own which is, however, approved by the EU. The majority of the organic producers are members of a private label organization. In certain countries (e.g., Germany) the vast number of organic labels is rather irritating for consumers and thus harmful for the organic business as a whole. For this reason different attempts are ongoing to create fewer easy-to-communicate umbrella labels. Up to now, however, only France and since 2001 Germany have created a "state" label to certify this lowest production level *(«ab» = agriculture biologique in France, the "Oekopruefzeichen" in Germany)*. Switzerland is in this respect an exception because the private and traditional label of the organic association of growers, transformers and traders "BIO-SUISSE" has an almost dominating status. First, this fact is strengthening considerably the unity and power of the Swiss Organic Movement as well as in marketing and political activities. Secondly, it renders any creation of a state label unnecessary.

Concerning the allowed input agents for plant protection, animal husbandry, fertilization and food processing, each EU country is maintaining, besides the EU ordinance 2092/91, its national laws and registration rules. This is the reason why, for example, the use of copper is allowed in most European countries (as it is in the EU ordinance), except in Denmark and The Netherlands. This unevenness is causing difficult production problems for organic fruit growers of these latter countries. Apart from EU or national legislation each private label organization can set up even more restrictions, but not less. The recently founded European Group of Researchers in Organic Fruit (EUGROF) is presently putting together

TABLE 1

Production area, fruit species and subsidies for organic fruit and berry production in Europe (data sources: Lindhard and Callesen, 1999; Weibel 2001).

Country	Production area (ha)	Species	Subsidies in Euro per ha and year
Portugal	16,333	Olives, grapes, dry fruit and most other species	180-603 depending on species and whether irrigated or not
Spain	2,215	Apples, pears, peaches, citrus, olives	460
Italy	152,000 (including vegetables)	Olives, grapes, citrus, apple, etc. In South Tyrol, 540 ha of organic pipfruit production	460
Greece	several hundred	Olives, grapes	Grapes: 608
France	7,000 of which 3,000 in transition	Chestnut (approx. 3,500 ha), apples (approx. 820 ha), pears, peaches, plums, apricots, cherries	762 the first 3 years
Switzerland	360 (additionally 6,000-8,000 t pipfruit per year for organic apple juice production from high stem trees)	Apple (220 ha), pears, apricot, cherries, plums berries, kiwi	1200 + transition subsidies (amounts and duration [2-5 years] depending on the province) + direct payments of the Federation for ecological performances to increase biodiversity (same amounts as Integrated fruit growers get)
Austria	598	Apples, currants, strawberries, pears, etc.	727
Belgium	209	Apples, pears, strawberries	744 first 2 years, then 842
Germany	980	most species except olives, citrus	511 in province Baden Württemberg
The Netherlands	320	Apples, pears, strawberries	11,344 the first 5 years
United Kingdom	456	Apples, pears, plums, cherries	706 distributed over the first 5 years
Denmark	306	Black currants, strawberries, apples, sweet cherries	406 the first 2 years; then 4 years a gradual reduction to 0.
Norway	57	Apples, pears, plums, diff. berries	727 the first 2 years then 182
Sweden	189	Strawberries, apples, other berries	0

an overview list with the registration status of all important organic plant protection products for organic fruit production (Weibel, 2001). Also with other important products for organic fruit production such as Neem oil, Quassin, Granulosis Virus, Mating Disruption with pheromones or Calcium polysulfide (Lime Sulfur) the registration situation is not at all homogenous across Europe. In Switzerland the Research Institute of Organic Farming, contracted by BIO-SUISSE, is releasing yearly a list of the allowed products which is posted to all organic farmers ("Hilfstoffliste"; it can be ordered at www.fibl.ch). The products of this list have been tested for their organic compatibility not only by their active compound(s) but also by their formulation additives. The latter would not be possible without very strict secrecy requirements and a good confidential contact with the companies.

Still a Niche Market

In some countries like The Netherlands, Germany and France the marketing of organic fruit is carried out predominantly by relatively small organic-, bio- or health-shops. Supermarkets have only 5% in The Netherlands, 23% in Italy and 25% in Germany of the organic market (Michelsen et al., 1999). In other countries like Switzerland, the United Kingdom and the states of northern Europe the predominant market shares of organic produce including fruit are clearly in the hands of supermarket chains (57%, 73% and more than 90%, respectively, of the organic market [Michelsen et al., 1999]). The differences in market structures have a great influence on the production and communication strategies that the organic growers and retailers must undertake.

In most European countries the proportion of organically produced fruit is still less than 1% of the total fruit production. For Italy the estimation is 1 to 2%, for The Netherlands 2% and for Switzerland 4 to 5% market share. The poll of Lindhard and Callesen (1999) shows that in all countries the tendency is increasing. Nevertheless it means that organic fruit still is a niche market. Why is that so? For supermarkets—and it is the supermarket chains who, in fact, have the main potential for the future market expansion—organic fruit still is a "new" product. Their skill to handle, position and advertise organic fruit for this new generation of (potential) organic buyers is still inexperienced and far from the optimum. With organic vegetables where a "substitution" for conventional products is much easier to achieve than with fruit, in Switzerland, a market share of 15% could be achieved. Theoretically there should not be a reason why there are fewer organic buyers for fruit than for vegetables. Thus, the longer-term production estimates for the Swiss organic fruit market are optimistic and vary around 15% which means a threefold increase of the current production.

Why Do Fruit Growers Hesitate to Convert to Organic Production?

There are two major reasons why conventional and IFP fruit growers hesitate with conversion. First, the organic fruit market is still new and not a highly professionalized industry compared to conventional fruit. Thus farmers, before undertaking high investment risks, wait for a solid confirmation of the organic trend. Second, although fundamental technical improvements have been made since the early '90s, the yield risk in organic fruit growing is still considerably higher than in IFP with average yield decreases of 15 to 30%.

The key problems inhibiting conventional or IFP fruit growers from conversion are:

1. Variety choice: Globally, the modern trend in apple varieties (as Braeburn, Fuji, Gala, Pacific Rose, Pink Lady, etc.) tend to be very scab sensitive. They are not suitable at all for organic production, at least in humid climates. Resistant varieties, however, cannot yet fully compete with these mainstream varieties partly in terms of sensorial quality and often in their storage capability. In addition, the introduction of any new variety is extremely expensive. This large dilemma between market demands and sustainable production poses a difficult starting point for the expansion of organic apple production. Unfortunately the situation is even worse with stone fruit where resistance breeding is further behind compared with apple.
2. Less efficient or even no plant protection products: As a general rule, in the more humid (northern) production zones (>900 mm [35 inches] rainfall per year) diseases such as apple and pear scab, fire blight, wood canker, sooty blotch, monilia fruit rot, etc. are the key problems organic growers are struggling with, whereas insect and mite problems are of dominating importance in dryer (southern) growing regions.

   With the exception of Neem oil (against rosy apple aphid) and lime sulfur (against scab), both having a slight penetrating (systemic) effect, there are no natural products with a curative effect. Thus, in situations of high disease or pest pressure, the direct organic plant protection measures often fail. Against brown rot monilia in stone fruit there is no efficient product existing, rendering organic stone fruit production extremely difficult. Therefore, the costly set up of as many as possible indirect measures is a must in organic fruit production, e.g., tolerant varieties, ecological compensation surfaces and elements to increase the orchard biodiversity, larger planting densities, mechanical reduction of the disease and pest inoculum, measures to increase soil fertility in order improve the stress tolerance of the trees, etc.
3. Weed control/understory management: Especially with dwarfing rootstocks the control of weed competition for water and nutrients is important for efficient tree performance. All alternatives to herbicides including mechanical tillage, mulching with bark or straw, weed maps, undersown plants are expensive and labor intensive.
4. Tree nutrition: The lack of readily available plant fertilizers, mainly nitrogen, magnesium and microelement, is thought by some growers and extension workers to be the main reason for yield decreases in organic apple growing. A clear scientific explanation is not available. Probably more than realized previously, the reduced tree performance is also due to the relatively high dosages of sulfur in organic fruit production (Ferree, 1979). McArthey et al. (2001) found up to 30% decreased photosynthesis on sulfur treated Braeburn apple trees. Fertilizer companies are releasing better and more crop-specific organic fertilizers. Nevertheless, the buildup and maintenance of a high soil fertility and structural stability remain a key concern of organic (fruit) growing.
5. Fruit thinning: Under the absence of synthetic thinners, early thinning (blossoms) is a major concern to achieve high quality and regular fruit yields. For the moment the best alternatives are the use of the rope machine or two or three applications of lime sulfur at 2%.
6. Relatively little support of research and extension: For years, organic production, in particular with horticultural crops, was considered as "not a possible option for the industry." Consequently, the support in terms of research and extension was almost zero compared with the development efforts for IFP. Today the situation is different. The potential of the organic fruit market and production is generally accepted. Worldwide scientists and extension workers are increasing their input into organic or organic-usable projects, a trend that certainly will carry fruit for the development for the organic fruit industry.

Economy of Organic Fruit Production

Data on the economy of organic fruit growing in Europe are infrequently assessed and cannot be considered as really representative. Many organic farms with fruit production differ substantially from conventional farm in that they have a high proportion of direct selling, have a high production diversity and fruit production is carried out rather extensively. The assessments of Schmid (1999) in Switzerland (14 organic fruit farms) and Stockert (2000) with 10 organic fruit farms in southern Germany, however, allow a reasonable comparison with an average IFP system. Both authors came to quite similar conclusions. In Figure 2 the data of Schmid (1999) are given (partly adjusted to the situation in 2001).

The reasons for higher production costs in organic fruit growing compared to IFP do or can occur by higher costs for:

1. Plant protection: if expensive organic products such as Neem Oil, clay powders, soaps (for mite and/or sooty blotch control), Granulosis Virus, Quassia and other special products have to be used.
2. Weed control: Because organic growers work with the same rootstocks as in conventional systems, trees are very sensitive to weed competition. Besides more labor and machinery costs for the mechanical tillage of the weed strips, 30-40 additional hours per hectare are needed for hand hoeing to clean the area around the stems from weeds (if this were not done, heavy vole damages can occur). (Our) experiments to find modern-type rootstocks that can support more weed competition but are (semi) dwarfing and highly productive at the same time are still too young to draw conclusions. However there is certainly an interesting potential for organic fruit growing to discover.

3. Hand work for blossom thinning: many organic fruit farms spend 70 to 120 and occasionally even more labor hours for blossom thinning to control biennial bearing and to increase fruit quality.
4. Vole control: as there are no organic rodenticides available, organic growers often spend more than 30 Lh/ha for mice control with traps and or special CO_2 exhausters.
5. Tree material: the obligation to use certified organic trees for new plantations increases the costs of the orchard set up by about 10%. The tree quality of the few organic nurseries is frequently not satisfying yet. The high standard of the conventional trees is setting a difficult-to-achieve organic threshold mark.

In the interpretation of the economic data in Figure 2 it has to be taken in consideration that in Switzerland during the last years of IFP Golden Delicious, Gloster, Idared and other "old" main varieties have achieved only half of the price which has been taken for this model calculation. Thus, in cases with "old" varieties the organic production is or can be even much more profitable than shown in the model calculation. However, the model calculation also shows that organic fruit growing is depending existentially on a considerably higher farmgate price for the product (32% in this case).

The fact that the farmgate price for organic fruit is 30% or more higher than conventional fruit can lead to an extremely high selling price at the point of sale if packers and retailers apply routinely the same margins on the product (usually 28-32% in Switzerland). Average supermarket consumers, however, are not willing to pay these excessive prices. In Switzerland, the retailers and supermarket chains have therefore reduced their percentage margins toward the absolute margins (in money units) that they have on conventional fruit. This led to the consumer and grower friendly situation that the prices at the point of sale are usually around only 32 to 40% (and only rarely up to 70%) higher than for conventional fruit.

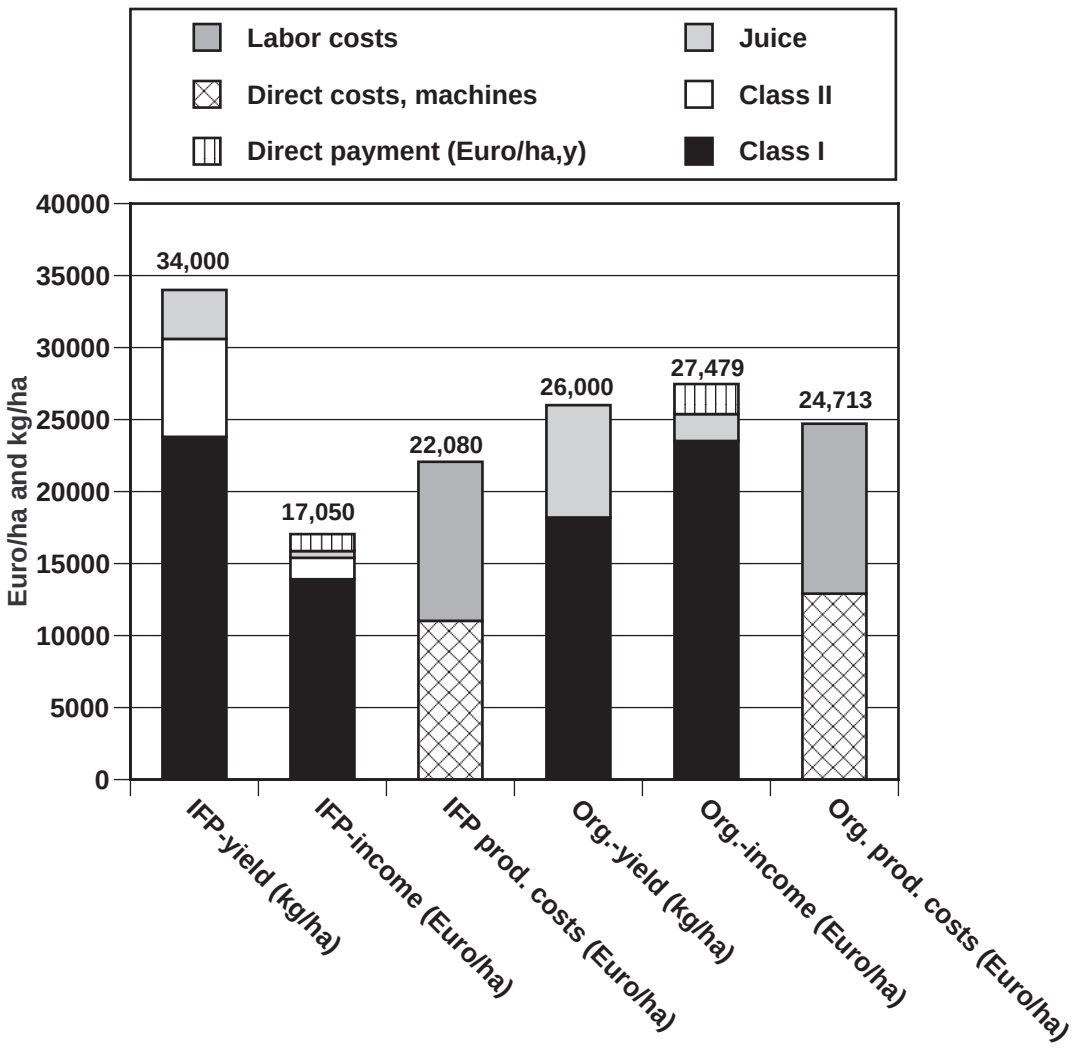
Another important economic advantage for the growers is that the market is not saturated and that they are usually sold out rather quickly. Thus they have lower costs for storage, less storage risks to bear and are under less pressure to reduce the price or to attempt costly selling activities.

Perspectives Have to be Formed Actively

On the marketing side, there is a clear tendency that supermarkets aim for a simple "substitution" of the conventional by organic fruit. So they demand the same requirements for the organic fruit as for conventional or IFP such as en-vogue varieties and perfect external quality, not taking in consideration what this means in terms of a *credible sustainable* production. Because this market pressure is feeding back to the growers in a way that they also tend to carry out just a "substitute organic" so rather plant disease sensitive world varieties than less known tolerant or resistant varieties and apply some of the sprays rather for cosmetic reasons than for the plant health. Even though only natural inputs are used, the question arises whether this tendency is still in accordance with the idea—and with the consumer expectation—of organic farming. In Switzerland, until today BIO-SUISSE could defend separate sorting standards for organic fruit tolerating, for example, some small spots of scab, sooty blotch, small healed insect damages and smaller fruit sizes. On the other hand, skin color prescriptions, as a good indicator of inner fruit quality, are more strict than for conventional apples. A

FIGURE 2

Yield, income and cost comparisons for IFP and organic production of Golden Delicious in 2001. Prices (in Euro) for IFP Class I .58, IFP Class II .22, IFP juice .14, Organic fresh 1.29, Organic juice .24.



successful step toward better communication with the organic fruit consumers is that "Coop," the second biggest supermarket chain of Switzerland, has introduced a new marketing concept to ease the market introduction of unknown, mainly scab-resistant apple varieties (Weibel and Grab, 2000). This concept is informing and guiding the apple consumer primarily by different taste groups. These groups are also visualized by different colors of the packing labels. The variety names remain indicated but are of secondary importance.

In Switzerland, the described discussion on the sorting prescription takes place at a yearly preharvest meeting among organic fruit growers and retailers. It demands considerable communication efforts on one hand. On the other hand, it is a rewarding exchange, finally, for the benefit of all partners.

REFERENCES

Balfour, Lady Eve. 1943. The Living Soil. Faber & Faber. London.

Beeman, R.S. 1995. A green and permanent land–Agriculture in the age of ecology 1925-1985. Dissertation thesis. Ames/Iowa. 330 p.

Bromfield, L. 1949. Out of the Earth. Harper & Brothers, New York. 305 p.

Büsselberg, W. 1937. Natürlicher Landbau – Bodenständige und gesunde Ernährung. Deutsche Volksgesundheit, Nürnberg. 752 p.

Conford, P. (ed.). 1988. The Organic Tradition—An Anthology of the Writings on Organic Farming 1900-1950. Green Books, Bideford/Devon. 224 p.

EEC. 2000: Council Regulation (EEC) No 2092/91 of 24 June 1991 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs; Official Journal L 198, 22/07/1991 p. 1 – 15; http://www.prolink.de/~hps/

FAO/WHO, C.A.C. 1999: Codex Alimentarius: Guidelines for the Production, Processing, Labeling and Marketing of Organically Produced Foods. CAC/GL 32.

Faulkner, E.H. 1943. Plowmen's Folley. Grosset & Dunlap, New York. 155 p.

Ferree, D.C. 1979. Influence of pesticide on photosynthesis of crop plants. pp. 331-341. In: R. Marcelle, H. Clijsters and M. Van Poucke (eds). Photosynthesis and Plant Development. W. Junk Publ., The Hague.

Howard, Sir Albert. 1940. An Agricultural Testament Oxford University Press, London.

Könemann, E. 1939. Biologische Bodenlkultur und Düngewirtschaft. Siebeneicher, Tutzing. 413 p.

Lindhard, H. and O. Callesen. 1999. Questionnaire on organic fruit and berry production in Europe. EUFRIN-Information: http://www.ctifl.fr/eufrin/organic.htm; 3 p.

Madison, M.G. 1995. Green Fields: The agrarian conservation movement in America, 1890-1990. Dissertation thesis. Cambridge/Massachusetts. 413 p.

Michelsen, J., U. Hamm, E. Wynen and E. Roth. The European market for organic products: growth and development. University of Hohenheim, Stuttgart, ISBN Nr. 3-933403-06-5. 199 p.

Moen, D.G. 1997. The emergent culture of the Japanese farming movement and its implication for political economy. Dissertation thesis. Madison/Wisconsin. 588 p.

Peters, S.M. 1979 The land in trust—A social history of the organic farming movement. Dissertation Thesis. Montreal. 349 p.

Rusch, H-P. 1968. Bodenfruchtbarkeit—Eine Studie biologischen Denkens. K.F. Haug, Heidelberg. 243 p.

Steiner, R. 1923, 1985. Geisteswissenschaftliche Grundlagen zum Gedeihen der Landwirtschaft. Rudolf Steiner Verlag, Dornach. 258 p.

Vogt, G. 2000a. Origins, development and future challenges of organic farming. Proceedings 13th Int. Congress of Int. Federation of Organic Movements (IFOAM), August 24-30 at Basel, Switzerland. 708-711.

Vogt, G. 2000b. Entstehung und Entwicklung des ökologischen Landbaus im deutschsprachigen Raum. Stiftung Ökologie & Landbau, Bad Dürkheim. 370 p.

Weibel, F.P. 2001. European Group of Researchers in Organic Fruit Founded. http://www.fibl.ch/news; 15 p.

Weibel, F.P. and F. Grab. 2000. Sustainable production needs sustainable marketing: Evaluation of a new marketing concept to introduce organically grown scab *(Venturia inaequalis)* resistant apple varieties at the Swiss supermarket retailer Coop. Proceedings of the 13th Int. Fed. of Organic Movements (IFOAM) Scientific Conference. 28-31 August 2000. Basel, Switzerland. p. 255–258.

Weibel, F.P. and A. Häseli. 2000. Organic apple growing in central Europe. In: Apple Growing. CABI (submitted and accepted in 2000).

WEB SITES

BIO-SUISSE: http://www.bio-suisse.ch (g, f, e)

Coop: http://naturaplan.coop.ch/d/natur/ (ge, fr)

European Standards for organic agriculture: http://www.lfe.bayern.de/oeko/fort_vo.html (ge)

FiBL, Research Institute of Organic Farming: http://www.fibl.ch (ge, fr, en)

IFOAM, International Federation of Organic Movements: http://www.ifoam.org/ (en)

Migros: http://www.migros.ch (ge, fr)

Swiss Standards for organic agriculture: http://www.admin.ch/ch/d/sr/c910_18.html (ge, fr, it)