

## Sustainable apple breedings needs sustainable marketing and management

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### Abstract

*Apple breeding programmes are currently in the middle of transition in terms of ownership and management. Until now most of them were funded by the public. Breeding took place by traditional methods since decades in a very sustainable way to develop better apple varieties. Today, increasing loss of national boundaries and globalisation, less interest by national bodies and institutions and rising cost levels for high tech breeding methods entire programmes are nowadays urged to look for new sustainable co- or self-financing business models in order to continue their work. The paper explains through financial calculations how risk can be split by all partners and how the supply chain can be developed further into a value chain by using a collective royalty system on trees and fruit, to add value to all market participants and to support the breeding efforts and to become sustainable through profitability. A leading shift of mindset requires the involvement of variety managers and companies who are coaching the whole process of introduction.*

**Key words:** value chain, product life cycle, intellectual property rights, royalty flow.

### Introduction

Consumers and the entire society require increasing levels of food from availability all season around, from produced quality to the it is produced. Over decades some successful new apple varieties have always added value to fruit growers by a higher level of performances like distinctive characteristics in flavour, shelf-life, eating quality, robustness against diseases and/or pests. Yet, in this increasing complex and fast turning world people forget over time why new varieties succeeded in the market, where they came from who introduced them and how long it takes to introduce an apple variety in general. Worldwide, fast and cheap communication, increasing transparent markets and global trade accelerates competition and threatens sustainable returns and mid- to long term thinking strategies. The whole process to launch a new apple variety, from crossing, selection, evaluation to commercialisation needs about 18 to 22 years (Kellerhals et al. 2007). Today, new varieties are getting more and more introduced not only by using the variety name but also by the attachment of a brand's name. Main objectives of this undertaking are to protect the whole innovative process of introduction, to get the brand established at business or consumer levels and to receive sustainable returns for the up-front investments. Most of the brands are business-to-consumer brands and need big budgets for promotion and sales campaigns. Therefore, variety managers and their companies are using royalty flows on trees and fruit (table 2) in order to finance the introduction of the new variety as to co-finance the ongoing breeding program. In this context intellectual property rights are needed in order to attract investors to start something new and implement an innovative idea or product. An increasing complex and accelerating world is threatening existing, traditional supply-demand relationships.

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In the context to launch a new variety new networks are coming up. All chain members within the supply and value chain are getting voluntarily involved in the same project. Breeder, extension, nurseryman, grower, packer, transporter, customer, consumer and marketing people. Intelligent and efficient tools facilitate the way to communicate between all chain levels. Reports on performance of the quality of fruit and feedbacks by customers and consumers turn the results into a learning evolutionary process.

### Material and Methods

Datas and financial values used for calculating purposes derive from current business models in Europe to introduce new apple varieties. In table 2 a fruit royalty level of 3 % was used at a net return price level for the grower of 0,60 € per kg. A tree royalty fee was taken of 0,75 € per tree and the estimated rise of production cost calculated (Streef, 2007). Table 3 shows a cost structure which distinguishes the different contribution of tasks from breeding to the physical introduction of the apple. All figures may vary significantly depending on the country where the apple is getting released, on wage, public funding and financial, human and technical resources. Yet, they give an understanding on overall costs involved with the release of a new variety. As a production target 10'000 tons of apples and 400 ha orchards over a period of 10 years are taken as a basis for the calculation of table 4. To simplify the financial model over time and from a careful point of view, the annual amount of fruit sold under brand specifications are 25 tons per ha. As a mean production level over 10 years the volume of 10'000 tons was divided by 2 to 5'000 tons. The return price is set at 0,60 € per kg and the fruit royalty of 3 % given. A planting density of 3'000 trees per ha on 400 ha need 1.2 million tree. This figure is multiplied with a tree royalty of 0,75 € per tree and divided through a 10 years time period. A profit margin for managed varieties between 20 and 30 % in comparison to a reference return is common goal of all business models for new varieties. Hypothesis: in case, that 10 % of this profit margin growers are receiving will be divided by 2 to 5'000 tons and multiplied with 10 % of cross return the annual financial return of added value would be 300'000 € p.a.

### Results

The product life cycle of an apple orchard takes in general about 15 years. Therefore, and because of it's high investment to establish the orchard careful evaluation whether to invest into a new apple variety or not has to be carried out. In comparison to existing commercial varieties which are getting produced without any royalty system, have been established since years and respond to simple supply / demand functions, the new business model of a managed variety implicates four parameters which need to be considered by the grower prior investing in a new variety and brand (table 1). Within such a scheme, all technical questions about yield, fruit size, regular crop, disease susceptibility etc. shall be answered under the parameter "return on investment".

Table 1: Overall 4 parameters and targets to create a sustainable integrated system

Parameters	Targets
Return on Investment	Sustainable management
Profile of Intellectual Property	Orientation and Responsibility
Supply and Value Chain	Quality of relationships and communication
Market Response	Dedication to organic production, fruit quality and ethics.

A managed variety system requires additional costs (table 2) like a one time investment in tree royalty for the management of the variety and the value of the new variety itself, the original budwood. The level of tree royalty ranges between 0,75 and 1,85 € per tree (Görgens 2006). At a tree density level of 3'000 trees, the upfront investment taken by the grower is between 2'250 € and 5'550 €. Furthermore, a permanent fruit royalty income is guaranteed to follow up and protect the exclusive introduction of the variety. In this case the 3 % royalty level was taken on a basis of 60 € per 100 kg return for the grower. The rise of production cost is associated with higher labour cost for pruning, fruit thinning and several picks during harvest time. From a conservative point of view, the additional overhead cost can be calculated at 10,60 € per 100 kg. The sales target of a managed variety is calculated on an averaged basis of 20 to 30 % above a referenced apple variety, which adds up value of 12 to 18 € per per 100 kg. This shows, that well managed varieties pay back the extra investment cost.

Table 2: Overhead cost structure through a royalty system to finance the introduction of a managed apple variety.

Cost structure	EUR per 100 kg	share %
Fruit royalty (3 %)	1.8	17
Tree royalty (0,75 € per tree)	2.0	18
Rise of production cost	6.8	65
Total	10.6	100

Depending on the size of a breeding program, it's technical equipment and labor cost it is very difficult to calculate the exact cost structure for breeding and selection. Yet, the annual amount of 82'500 € should be regarded as an average figure, which may be in Eastern European countries less and in Western European countries more. The innovative process to introduce a new apple cultivar does not stop with the selection. It continues with the set-up of a research network system of testing sites in order to identify the best growing locations in Europe. In addition to that, marketing costs to establish a corporate design and identity and to communicate the purpose of undertaking can be calculated on an annual cost basis of 35'000 €. Management costs involve the set up of new relationship platforms to commercialize the apple and the maintenance of contracts with licensed partners. With a share of 49 % of total 167'500 € annual capital needed, the costs of breeding & selection are significant (table 3).

Table 3: Overall budget to introduce a new managed variety into the market.

Cost structure	per annum	share %
Breeding & Selection	82500	49
Testing & Evaluation	30000	18
Marketing & Public Relation	35000	21
Management	20000	12
Total	167500	100

Innovative new apple varieties shall add value in order to stay competitive in the market and to pay back the investments. In the described business model, the calculation is based on a surface of 400 ha planted apple orchards and a production volume of annually 10'000 tons.

The financial returns (table 4) are generated through fruit royalties and tree royalties, where the main share of 55% is coming from fruit royalties.

Table 4: Financial return within a time frame of ten years and a production target of 10000 tons annual production and 400 ha of apple orchard.

Financial Returns	per annum	share %
Fruit Royalty	90000	21
Tree Royalty	45000	10
Profit margin (60 € per ton)	300000	69
Total	435000	100

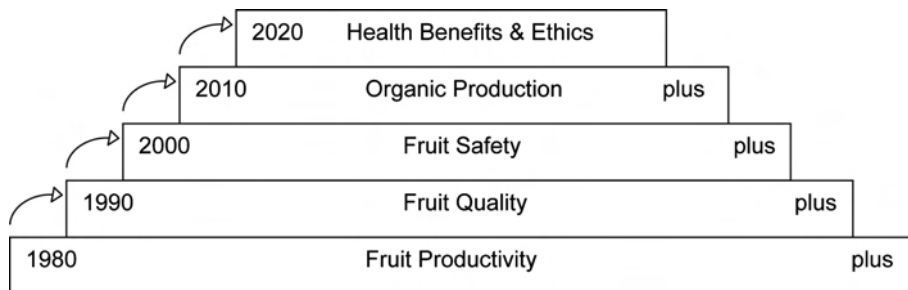


Figure 1: Change of the food industry and its objectives through decades (Sevillano, 2006).



Figure 2: Ahold's interpretation of pyramidal needs after Maslow (Source: D. Hughes, Imperial College, published Elfers, 2002)

## Discussion

If we simultaneously look back to 1992, which was only 15 years ago, and into the future until 2022, which is 15 years ahead, we realize that we are in the middle of a change of paradigm to start a new way of thinking regarding the use of new apple varieties. John Wilton's review (2002) about the success story of today's world leading varieties like Gala, Braeburn and Fuji demonstrated that, all varieties showed significant attributes different from existing varieties, all varieties first became fully accepted after a growing period of 15 to 20 years within their area of origin and that significant market penetration and consumer awareness can be achieved through promotion and branding (e.g. Pink Lady®). Within the organic market, managed varieties are just about to evolve. According to the change of the food industry (figure 1) and the interpretation of pyramidal needs (figure 2) organic grown apples are highly attractive and present an added value product at the end of the value chain. In alliance with the introduction of high profile apple cultivar it promises even more value contribution for all partners involved in the supply and value chain. Royalties are usually not regarded as they are able to create value by the leading investors, the fruit growers. Yet, new business models, where fruit and tree royalties are taken an estimated 20 to 30 % increase of growers return can be realized so far.

The biggest shift in thinking about the nature of cost structure is the differentiation between one time royalties as seen on the tree level at time of planting the trees and permanent revenues through the collection of fruit royalties over the period of time, an apple orchard exists. Within such a structure one block regards the cost structure of breeding and selection and testing and evaluation and the other block regards the marketing and public relation and management expenses. These costs accumulates almost to the same level of about 85'000 € each p.a. (table 3).

The set-up of marketing and management structure is needed and justified in order to get the value chain around a trademark started. If financial returns are evaluated, fruit royalties will increase over time with increasing volume and tree royalty will decrease once plantings have been carried out. Variety managers (Baab 2004) and their companies will take one part of the risk involvement when launching a new variety. A profit margin of 10 % out of overall targeted 20 to 30 % of growers additional revenue can be seen as a safety belt to ensure the profitability of the new investment for the grower, but if seen from the importance of a 69 % share of revenues (table 4), could lead also to the discussion, that growers may actively start to co-invest into breeding programs from whatever share of their profit margin in order to enable sustainable breeding through sustainable marketing and management. In any case, variety management and variety production are in the same boat and have to equally share profits within the value chain accordingly to market response. The fruit royalty flow is the only mean to guarantee a sustainable financial system in an increasing capitalised fruit market and privatised apple breeding programs.

The leading approach towards a new business model is to distinguish between a Business to Consumer trademark and a Business to Business brand. Today, new apple varieties are getting mainly introduced by creating a business to consumer trademark. One single apple cultivar gets attached to one trademark. This introduction takes place in a fairly restrictive way.

The introduction of the Golden Sunshine Line® is getting established on an European level and as a business to business trademark. It is a collection of several apple cultivars which supports the idea of bio diversity.

On the sales side of the apple, direct marketing efforts by the grower are welcomed and supported by the trademark owner. In this case, no fruit royalties are taken.

If the commercialisation of the new apple varieties are distributed via accredited sales desks, a fruit royalty is taken. Some share of this royalty flow is getting re-invested into the ongoing breeding program without any option for future releases.

The establishment of a B-to-B trademark on an international scale allows efficient marketing with relatively low cost involvement for the grower.

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