

Influencing factors for the further expansion of organic apple cultivation and breeding

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Abstract

Organic apple cultivation and breeding in Germany face several market and environmental challenges. A qualitative study was carried out to assess general market developments as well as promoting and inhibiting factors that influence the further expansion of both practices. Results show that cultivar launches on the glutted market for apples have been increasingly professionalized, using marketing and club concepts. Most relevant promoting factors are also beneficial developments for the whole organic food sector. Commercialization and specific demands for high aesthetic quality along the value chain and commercialization inhibit the further expansion of organic cultivation. Human, financial, and time resources are insufficient for breeding activities. State support in different facets would further promote organic breeding activities. Overall, strategic direction choices regarding cultivation and breeding seem to determine their further expansion. Results suggest a more distinguished demarcation from the conventional sector as well as an establishment of new cooperation promoting organic breeding activities.

Keywords: organic fruit cultivation, organic fruit breeding, market developments, sustainability, apples

Introduction

Organic apple cultivation in Germany faces several environmental challenges. For example, climate change has a significant impact on cultivation practices and creates a need for robust and adapted cultivars suitable for organic farming. However, current practices in conventional apple breeding contrast with these requirements (Wolter *et al.*, 2018) and fruit-specific market structures and norms negatively affect the sustainability of the whole social-ecological system (Sievers-Glotzbach & Wolter, 2018). These developments hamper the further expansion of organic apple cultivation and breeding. Available literature does not provide many clues about current market structures and developments for apples in Germany, especially for the organic sector. Besides general quantitative data (Garming *et al.*, 2018) and works on general world-wide trends such as club concepts, branding, and privatization (e.g., Legun, 2015; Schwartau, 2010; Weber, 2008), few studies exist on this topic. However, when trying to shape new strategies, business models, or initiatives for organic apple cultivation and breeding, it is necessary to understand the specific market and societal factors in detail.

The goal of this paper is to investigate factors that influence the further expansion of organic apple cultivation and breeding. In this context, organic apple cultivation is defined as cultivation that aims to promote soil health and agrobiodiversity, protect natural resources, and take responsibility for environmental protection as well as intra- and intergenerational justice (IFOAM, 2014). Organic apple breeding is understood as breeding embedded in the norms of organic agriculture, making selections under organic farming conditions, and matching breeding goals with the needs of organic apple cultivation (IFOAM, 2017).

A qualitative two-step Delphi study was carried out to identify and assess promoting and inhibiting factors that influence organic cultivation and breeding for the German apple

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market. The following section explains this methodical approach and the sample in detail. In the subsequent section on results, the derived data on market developments is described and provides an important context for the promoting and inhibiting factors explained after that. Lastly, the stated results will be discussed and interpreted.

Material and Methods

The Delphi method proved to be a fitting method for collecting detailed insights about market characteristics, potential, and challenges for organic apple breeding and cultivation. It further enables the integration of different actors and their perspectives on the topic (Häder, 2014). Two rounds of inquiry were carried out between November 2018 and April 2019.

In the first round (Nov. 2018 to Jan. 2019), 29 experts from the fields of organic fruit cultivation, breeding, marketing, research, and related fields from Germany, Austria, and Switzerland participated in an extensive online-questionnaire (see Table 1). In addition to other goals, the aim of the first round was to identify promoting and inhibiting factors for organic apple breeding and cultivation and estimate market developments and trends. The participants' answers on various factors were summarized and clustered, resulting in a list of a) factors that have promoting and inhibiting effects *currently* and b) factors that could be promoting or inhibiting *in the near future*. The distinguishing of these categories was a result of author interpretation. After the overall analysis of the questionnaire data, the participants received the results of the first round via e-mail.

In the second round (March 2019 to April 2019), 22 experts from the first round (see Table 1) participated in a follow-up questionnaire assessing the previously identified promoting and inhibiting factors. Assessment of the factors took place with a 7-point Likert scale, in which 1 means that the factor has low relevance and 7 means that the factor has very high relevance for promoting/inhibiting organic apple breeding or cultivation. Participants rated the factors accordingly.

Table 1: Self-classification of Delphi participants according to specific categories. Multiple answers were possible. n = overall number of participants in the respective rounds. Numbers in rows represent the number of experts assigned to the categories for every round.

Expert Categories	First round (n = 29)	Second round (n = 22)
Fruit breeding	3	2
Fruit cultivation	13	7
Marketing of fruits	6	3
Research on organic fruit cultivation	7	2
Research on organic fruit breeding	5	3
Research on marketing of organic fruits	1	1
Consulting	5	3
Associations	9	2
Other	8	2

This paper can only show abbreviated results of the Delphi study. In addition to these presented results, other aspects such as the importance of specific actors, their demands, norms, and specific business models have also been discussed in the course of the study.

Results

Market developments and trends

In the first round, participants were asked to describe market developments and trends in the German apple market. Summing up the results reveals three major developments: low

product diversity, the professionalization of cultivar launches, and the increasing use of club concepts or brandings.

First, there is a lack of diversity in the traits (e.g., taste, aesthetic quality) of broadly marketed apple cultivars in food retail. Participants observe a growing standardization. Aesthetic quality seems to be the most important trait for most trade partners and consumers. However, they also identify the growth of exclusive and niche markets, which indicate diverging developments. Especially in the organic sector, direct marketers consciously sell a broad diversity of apples to further distinguish themselves from conventional food retail.

Second, new apple cultivar launches have been increasingly professionalized, which is seen as a necessity to remain on the market. Experts develop marketing concepts for the market introduction of new cultivars, using brand protection and professional networks. This leads to a business and organizational professionalization and is followed by certain profit expectations of participating actors. Non-managed cultivars typically do not prevail on the glutted market for apples.

Third, club concepts increasingly play a major role in developing, cultivating, and managing apple varieties. This development correlates with the professionalization of cultivar launches. Participants acknowledge the economic and organizational value of club concepts (control of supply chain, profits, coordinated efforts) but also mention negative aspects. Farming club varieties puts high economic pressure on farmers because they closely link themselves and their business to the club (concept). Access to club varieties is restricted for actors outside the club and some participants see the concept as such as contrary to product diversity and regionality.

Promoting factors for organic apple cultivation

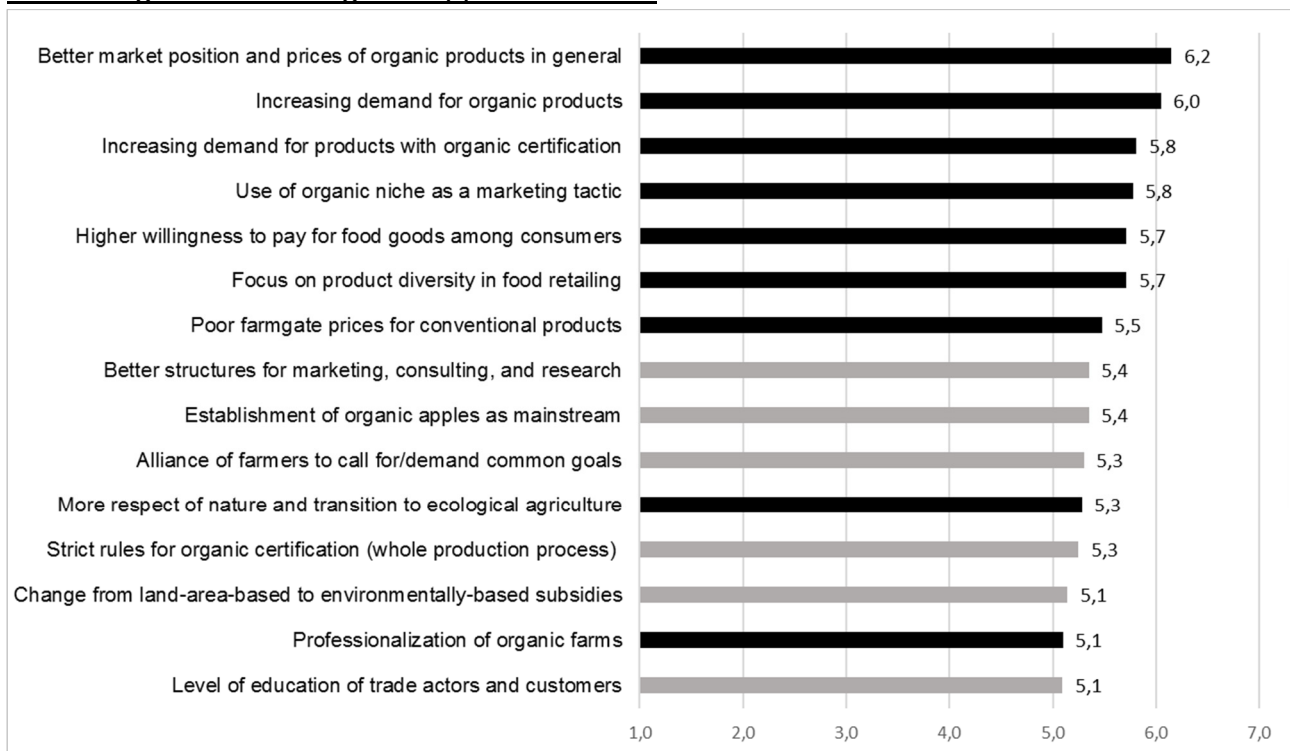


Figure 1: Promoting factors for organic apple cultivation. Mean value for Top 15 factors (out of 29 factors), rated on a 7-point Likert scale (n = 21). 1 = low relevance, 7 = very high relevance. Grey colored boxes indicate factors that could be promoting. Black colored boxes mark factors that are currently promoting.

Most important promoting factors for organic apple cultivation are also developments benefitting the whole organic food sector (i. e. better market position and prices for organic

products, increasing demand, marketing tactics, high willingness to pay) and a general focus on product diversity in food retailing. All of these factors have promoting effects at the moment and do not directly concern organic apple cultivation but rather indirectly influence its further expansion.

It is noticeable that all top-rated factors have current effects. Below them, better or alternative organizational and legal structures in the organic or general agricultural sector (structural changes, alliances, strict rules, change of subsidies) could have promoting effects in the near future.

Promoting factors for organic apple breeding

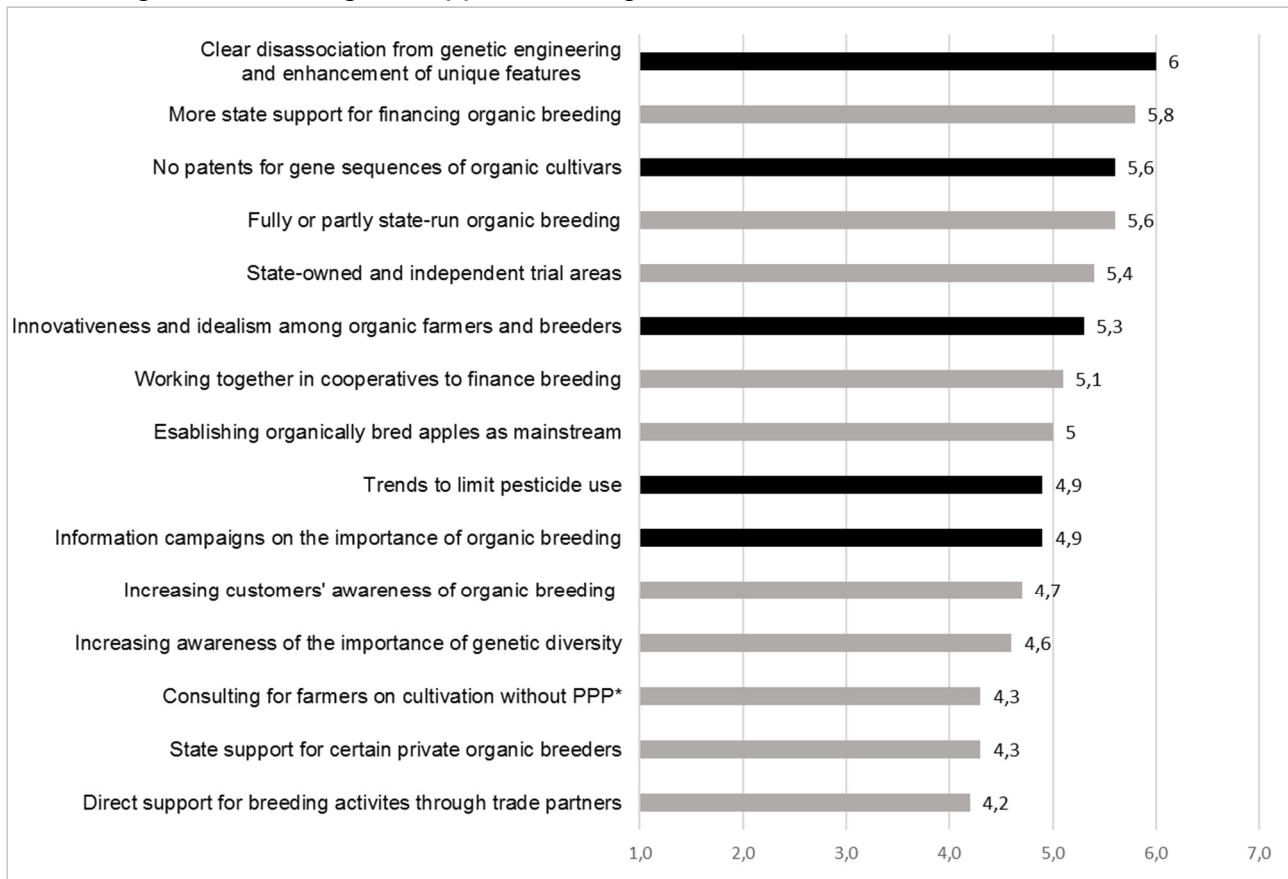


Figure 2: Promoting factors for organic apple breeding. Mean value for top 15 factors (out of 18 factors), rated on a 7-point Likert scale (n = 18). 1 = low relevance, 7 = very high relevance. Grey colored boxes indicate factors that could be promoting. Black colored boxes mark factors that are currently promoting.

Factors proving beneficial for organic apple breeding at the moment are the clear distinction from genetic engineering and patents as well as the innovative and idealistic spirit among organic breeders and farmers. Other, not so highly rated promoting factors are the general trend to limit pesticide use and recent information campaigns on the importance of organic breeding.

However, most of the identified factors are those that could have promoting effects. Multifaceted state support in would prove most relevant. Participants suggest more financial support, fully or partly state-run organic breeding activities, and state-owned trial areas. Another proposal for financing organic apple breeding is to working together in cooperatives.

Despite current information campaigns, participants recommend increasing awareness for organic breeding and the importance of genetic diversity.

In comparison to the promoting factors for organic apple cultivation, the top 15 factors for breeding have lower rates (6.2 to 5.1 for cultivation; 6 to 4.2 for breeding). The most prominent reason for this is the higher amount of promoting factors for cultivation (29 factors) than for breeding (18 factors). Additionally, participants mentioned and rated more current promoting factors for organic apple cultivation than for organic apple breeding.

Inhibiting factors for organic apple cultivation

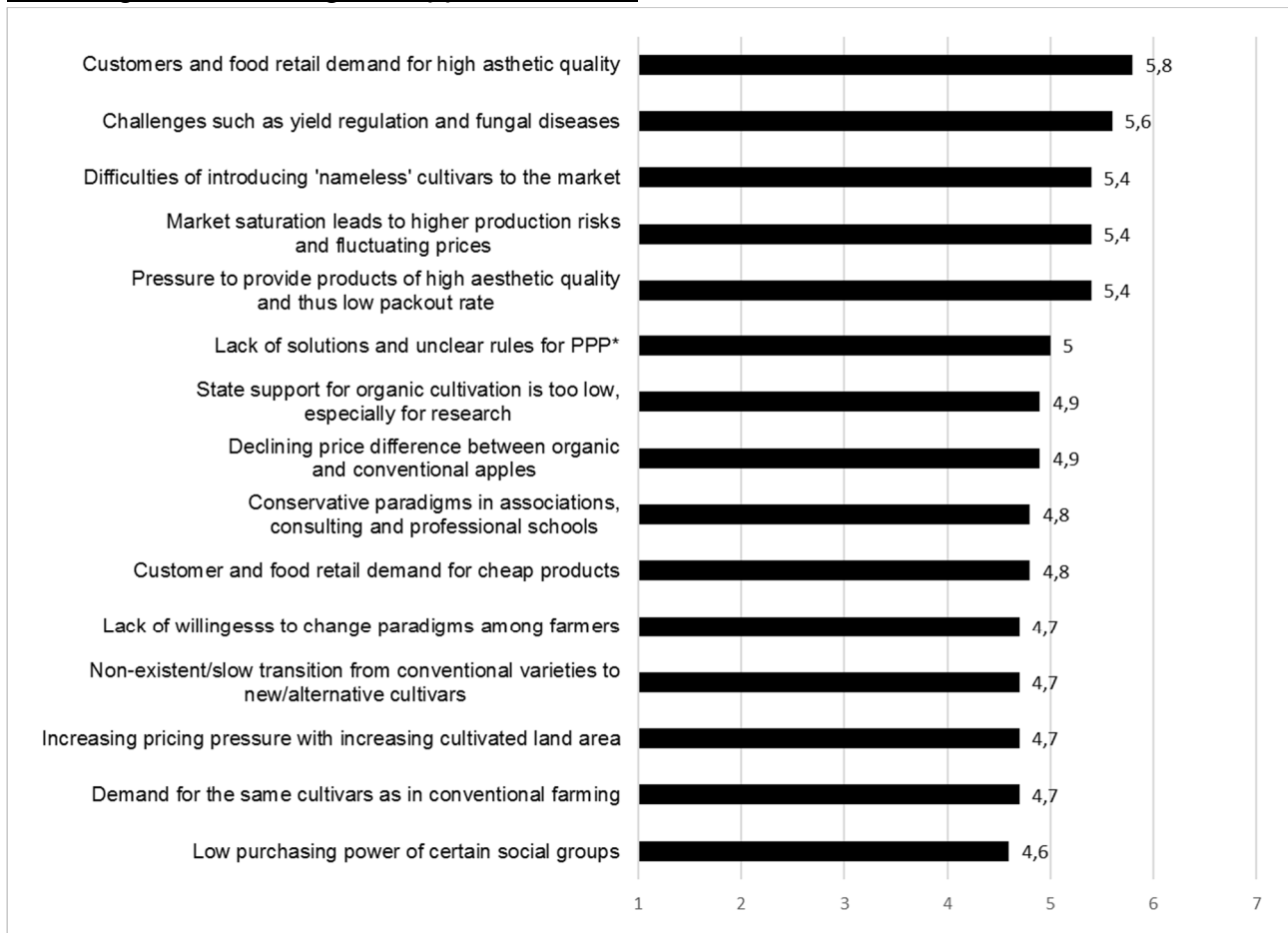


Figure 3: Inhibiting factors for organic apple cultivation. Mean value for top 15 factors (out of 36 factors), rated on a 7-point Likert scale (n = 21). 1 = low relevance, 7 = very high relevance. *PPP = Plant Protection Products.

For organic apple cultivation, the two core inhibiting factors are actors' specific demands along the value chain (high aesthetic quality of the product, cheap products) and the general market developments (market saturation, professionalization of cultivar launches). But also challenges in cultivation issues (yield regulation, fungal diseases, use of PPP) prove to be major factors that hamper the further expansion of organic apple cultivation. Another influencing factor is the lack of willingness to change paradigms or practices.

In an overall comparison, more inhibiting factors (36) have been identified and rated than promoting factors (29). However, on average the promoting factors are perceived to be of higher relevance than the inhibiting factors.

Inhibiting factors for organic apple breeding

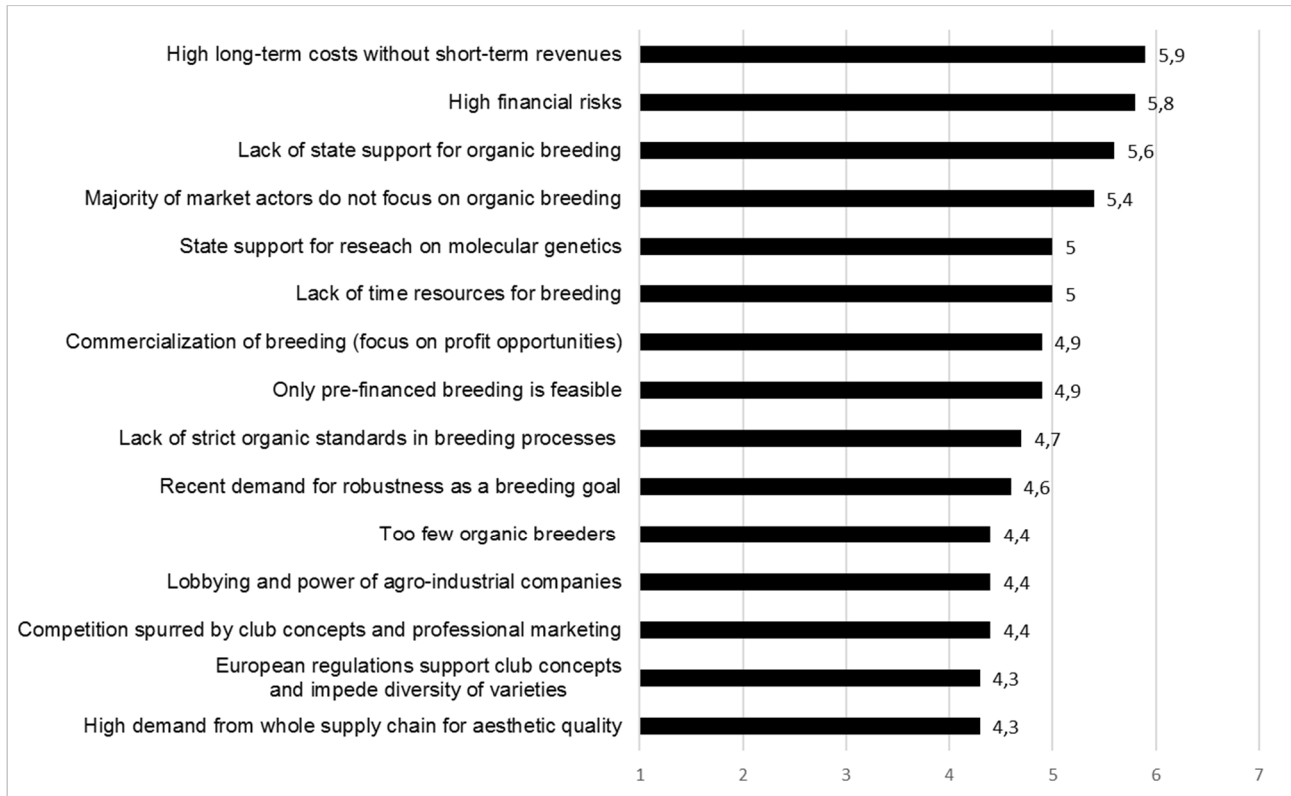


Figure 4: Inhibiting factors for organic apple breeding. Mean value for top 15 factors (out of 24 factors), rated on a 7-point Likert scale (n = 16). 1 = low relevance, 7 = very high relevance.

Overall, organic apple breeding experiences a lack of human, financial, and time resources. Long-term costs, high financial risks, and a lack of state support are observed as the most important inhibiting factors. According to the participants, the focus of public financing activities is rather on conventional and molecular breeding. Insufficient awareness of organic breeding correlates with the statements in Figure 2.

However, organic apple breeding is also negatively influenced by general developments like the commercialization of breeding, lack of standards, lobbying power of agroindustrial companies, and European regulations' direction of action. The clear connection between breeding and cultivation becomes apparent with the demand for high aesthetic quality. Changing cultivation actions and structures changes breeding actions and vice versa.

Parallel to organic apple cultivation, more inhibiting factors (24) than promoting factors (18) have been identified for breeding. On average, the ratings are of similar relevance. Similar to the promoting factors, more inhibiting factors exist for cultivation (36) than for breeding.

Discussion

General market developments influence organic apple cultivation both positively and negatively. While cultivation benefits from the growth and awareness of the whole organic food sector, specific demands for quality traits as well as commercialization and professionalization prove to be challenging. This connects with the saturation of the market: more and more fruit farmers are switching from conventional to organic standards (BÖLW, 2018, p. 7) due to the general positive trends and price incentives for producing organic foods. However, this challenges the organic market as in its current form and its goals (e.g., agrobiodiversity, regionality). While reconverting farmers change their production standards,

they often do not change their paradigms and cultivated varieties, impeding the broad introduction of new organically-bred varieties. Overall, farmers and marketers are shown to be the most important actors for the further expansion of organic apple cultivation.

In contrast, in terms of organic apple breeding, the state seems to be the most important actor for the further expansion. More state activities and support are seen as key for successful organic breeding. Secure and continued financing was identified as a necessary incentive for this long-term and risky activity. Besides low awareness on the state level, it is also perceived as generally too low regarding market actors and the general public. Although the survey results see state activities as the most relevant ones for a further expansion, the availability of alternative market mechanisms to finance and expand organic breeding should also be an option. Opportunities could include a holistic financing concept for the whole organic sector (Schäfer & Messmer, 2018), an adaptation of models like the 'breeding cent', open-source seeds licenses (Kotschi & Wirz, 2015) for fruits, or the institutionalization of wholly new and innovative forms of cooperation.

In conclusion, actors' strategic choices regarding organic apple cultivation and breeding seem highly relevant for its further expansion. Among these choices are further collaboration with conventional farmers and breeders, a further demarcation from the conventional sector through new institutions or further development of existing institutional structures, or aiming for cooperation across the whole organic food sector. Results suggest that the latter two options in particular or even a combination of both might be successful strategic directions. The top promoting factors for organic cultivation and breeding encourage the further demarcation. Additionally, the positive overall development of the organic sector could be a window of opportunity for establishing reliable financial cooperation and provide the awareness for organic breeding that it needs for further expansion.

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