

Organic Consumers' Purchasing Motives for Heirloom Vegetable Varieties

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Agrobiodiversity is the foundation of our ecosystems and food supply. However, agrobiodiversity is declining rapidly. A prominent strategy to safeguard endangered varieties, an important component of agrobiodiversity, is their cultivation and preservation in their natural environments. In order to make the cultivation of these varieties attractive to farmers, a functioning value chain and communication concepts for these goods have to be developed. Plant genetic resources comprise the genetic variety between and within species. This includes land-races, which are also known as farmers' varieties or underutilized crops. Heirloom vegetable varieties are a vital part of those resources. They are currently not in commercial use, as they have been forgotten, lost their commercial importance, or have been replaced by modern varieties. Consumers generally show a positive attitude towards heirloom varieties. They are associated with "nature/natural", "native/from here", "regional", "traditional", and an intensive taste.

Keywords: communication ; agrobiodiversity ; heirloom vegetable varieties ; red list ; focus groups

1. Introduction

According to the Convention on Biological Diversity, agrobiodiversity can be defined as a "broad term that includes all components of biological diversity of relevance to food and agriculture [...] the variety and variability of animals, plants and micro-organisms, at the genetic, species and ecosystem levels, which are necessary to sustain key functions of the agro-ecosystem, its structure and processes" ^[1] (COP decision V/5, appendix). Thus, agrobiodiversity is the foundation for the resilience of our agro-food systems ^[2]. One crucial component of agrobiodiversity is plant genetic resources.

Plant genetic resources are "the foundation of food production, and the biological basis for food security, livelihoods and economic development" ^[3]. Their current loss poses a threat to food security, local livelihoods, and the adaptability of ecosystems to changing environmental conditions ^{[4][5]}.

To preserve the genetic potential of plant genetic resources, they need to be protected. One prominent strategy to protect plant genetic resources is the *on-farm* conservation of endangered crops and varieties, meaning the active cultivation of endangered plants in their natural environments.

Yet, this strategy is not attractive for farmers because the cultivation of endangered crops is often labour intensive, and those plants are often not adapted to a modern agricultural system ^[6]. To make the cultivation of endangered crops attractive for horticulturists, a valorisation strategy must be established. This includes creating a sufficient demand and a functioning value chain for these products ^{[7][8]}.

On a large scale, such a valorisation strategy is lacking in Germany. Biodiversity-enhancing products, such as landraces, heirloom varieties, and underutilized crops, are currently almost exclusively sold via direct marketing, e.g., in farm shops or at market stalls ^{[9][10][11]}. Although organic supermarkets have gained a considerable market share in Germany over the last 10 years ^[12], experiences from indirect marketing channels, especially organic supermarkets, are rare. Consequently, their potential for the sale and thus conservation of heirloom varieties has not yet been utilised.

A major challenge for indirect marketing channels lies in the lack of personal communication between the producer and consumer ^[13]. Biodiversity-enhancing products are often in need of further explanation. They can be classified as 'credence good,' as their added value, such as the conservation of agrobiodiversity, cannot be assessed by consumers directly ^[14]. Therefore, effective and target-group-oriented communication tools for retailers are necessary ^{[11][15]}.

2. Importance of Plant Genetic Resources

Diversity of plant genetic resources is a crucial component to help the agricultural system adapt to future challenges, such as climate change or pests. It increases genetic potential with which breeders can react to new social and ecological challenges. Agrobiodiversity thus makes an important contribution to food security, the resilience of ecosystems, the

absorption of abiotic stress factors, and the adaptation of agricultural systems to climate change. It provides a pool of genetic resources needed to adapt to changes in natural systems ^{[11][16][17][18]}.

Consumers also benefit from a wide variety of species and varieties used. New products can be developed, e.g., with more valuable ingredients or more diverse sensory properties (e.g., appearance, taste) ^[11].

Despite these advantages, there is currently a significant loss of plant genetic resources used in agricultural systems. This is due to the standardisation of cultivation systems, the use of a few high-performance varieties, and consolidation in the breeding sector ^{[2][18][19]}.

3. Heirloom Varieties

Plant genetic resources comprise the genetic variety between and within species. This includes land-races, which are also known as farmers' varieties or underutilized crops ^{[20][21]}. Heirloom vegetable varieties are a vital part of those resources. They are currently not in commercial use, as they have been forgotten, lost their commercial importance, or have been replaced by modern varieties. However, they possess a potential to strengthen the resilience of agricultural systems and to diversify and improve the existing value chain in terms of sustainability and resilience ^{[21][22]}.

The German Ministry for Agriculture categorizes heirloom varieties as follows:

- Lost varieties: mentioned in historic sources, but not available in seed banks anymore and without variety approval within the EU;
- Traditional varieties: mentioned in historic sources and currently with variety approval;
- 'Red List' varieties: mentioned in historic sources and available in seed banks, but without variety approval within the EU ^[23].

The "Red List of Endangered Local Crops", which was last updated in 2018, contains over 2600 crop traits and varieties. They can be classified as indigenous (e.g., old German land variety), endangered (low to no current occurrence in situ/on-farm) or significant (e.g., potential for use by consumers or breeders). However, they no longer have variety protection or variety approval within the EU. Similar to the "Red List of Endangered Species" in nature conservation, the "Red List of Endangered Local Crops" is used to draw attention to the endangered status of useful plants and provides a higher incentive to conserve these species ^{[24][25]}. Hence, researchers include the "Red List" as a potential communication approach in this entry.

Plant diversity can be protected and preserved either in situ/on-farm or ex-situ.

In ex-situ conservation, plant genetic resources are stored in collections (gene banks) for conservation purposes. The genetic material is documented and characterised. The material is kept in its current status quo and is not further developed.

In-situ conservation is defined as the conservation of ecosystems and cultivated plants in their natural surroundings. On-farm conservation, as a special form of in situ conservation, is defined as the preservation of locally adopted regional varieties in the surroundings in which they have been developed. Hence, in on-farm conservation, the material is not merely stored but can be used to diversify the variety of cultivated species, human nutrition, or to generate additional income for farmers ^[26].

4. Consumer Attitudes towards Heirloom Varieties

As this entry investigates consumer attitudes towards heirloom vegetable varieties, in the following section researchers provide a brief overview on the existing literature on this topic, mainly focusing on Germany.

Several studies ^{[9][27][28]} provide a general overview of consumer attitudes towards heirloom varieties. In a qualitative survey, Bantle und Hamm ^[28] found a low level of knowledge about the loss of agrobiodiversity and its preservation through the use of heirloom varieties. This finding is supported by a study published in 2006 by Kleinhückelkotten et al. ^[9], who had not found an awareness of this topic in consumers' everyday lives either. In addition, there is a cognitive dissonance among consumers when they are confronted with the topic of agrobiodiversity loss, since in the subjective perception of consumers, the diversity in food retailing is increasing ^[9].

Knowledge about old varieties is often based on personal experience, e.g., whether an old variety has already been eaten by oneself. Gastronomy, media, and direct marketers can also serve as sources of information ^[28].

Consumers generally show a positive attitude towards heirloom varieties. They are associated with “nature/natural”, “native/from here”, “regional”, “traditional”, and an intensive taste. Modern varieties, on the other hand, are often rated negatively [28][29].

Consumers see the purchase of old varieties and their own cultivation, e.g., of fruit trees, as possible options for action to preserve old varieties [30]. Availability and price are seen as possible obstacles for their preservation [31].

Studies in other European countries have shown similar results. Notari and Ferencz [31] show a high interest in taste and regionality for traditional food in Hungary (especially tomatoes). A study on traditional maize carried out in Portugal shows a high level of interest in taste and quality among consumers surveyed [32]. Meier and Öhen [15] show that, although the labeling as a traditional/old variety is not an important purchasing criterion, consumers do generally accept the idea of more diverse varieties (here farmers' varieties) and are (hypothetically) willing to pay more for them.

In the US, heirloom vegetables have a longer tradition than in many European countries and can be classified as a status symbol for conscious consumers [33]. Shoppers often declare taste as an important factor when buying heirlooms. However, a study by Joseph et al. shows that consumers value visual appeal and a greater selection variety over taste when buying heirloom varieties [34].

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