

Vision of diversified and multifunctional tropical permanent crops

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Bio Suisse cultivates what is tried and tested, improves what already exists, creates something new and is committed to the progress and development of organic farming. This also includes the responsible, self-determined import and export of Bud products. The reality of cultivation systems of tropical permanent crops should be consistent with the Bio Suisse mission statement. The vision is intended to support the initiative of mitigating potential discrepancies and updating the Bio Suisse Standards accordingly.

This paper describes the vision formulated by Bio Suisse of diversified and multifunctional cultivation of tropical permanent crops. Chapter 1 explains why Bio Suisse prepared this paper. The second chapter presents the objectives that Bio Suisse is pursuing with this vision. Chapter 3 presents the vision, breaking down the core elements of diversified cultivation of tropical permanent crops into environmental and socio-economic elements. Chapter 4 discusses how Bio Suisse intends to achieve the vision.

1 Starting point

Various tropical permanent crops such as avocados, coffee and oil palms have long been the subject of public scrutiny due to environmental and social sustainability issues. In large part, these issues are related to the fact that these crops are often cultivated in large-scale monocultures¹. Around the world, monocultures are increasingly becoming established as a production-maximising and scalable cultivation system (Salaheen and Biswas, 2019, p. 27). While large-scale monocultures may be promising from an economic perspective as an immediately productive and cost-effective cultivation system, they are associated with a range of drawbacks, particularly from an environmental standpoint (ISD, 2023; Sánchez et al., 2022).

Monocultures tend, for example, to lead to soil degradation. They are also associated with the destruction of natural vegetation and even deforestation in the pursuit of land and thus exacerbate global warming (Grass et al., 2020; León and Osorio, 2014, p. 1). Large-scale monocultures are also associated with lower landscape heterogeneity and accelerate the loss of biodiversity (Azhar et al., 2015). This, in turn, can compromise the function of ecosystem services and thus reduce the multifunctionality of an ecosystem (Allan et al., 2015; Isbell et al., 2011). The strong focus on maximising the economic benefits of a cultivation system is another rationale for limiting its multifunctionality (Grass et al. 2020; Lewis et al., 2015). Ultimately, this also means that agricultural intensification weakens the ecological resilience of cultivation systems and makes them more vulnerable to disruptions. Paradoxically, however, the changing climate and the rise in extreme incidents requires agricultural cultivation systems to have increased reaction and regeneration capabilities (Tscharnitke et al., 2011). The continuing expansion of monocultures causes a multitude of other negative consequences as well. First, monocultures generally result in changes to the water cycle and the regional water balance, which

¹ The classification of areas under cultivation as large-scale monocultures depends on the context and the characteristics. The definition of large-scale is determined by weighing a combination of variables, including mechanisation and biodiversity connectivity. The definition of a large-scale monoculture will be elaborated after the publication of this vision.

can ultimately have a negative impact on the local population, such as in the case of palm oil monocultures (Merten et al., 2016). Second, monocultures are more susceptible to drought than diversified systems (Liu et al., 2022). Third, monocultures increase disease and pest pressure, which is usually associated with intensive crop protection.

In view of the immense importance of tropical forests for the climate and biodiversity, the aforementioned risks of monocultures are particularly relevant in the tropics (Arroyo et al., 2020; Artaxo et al., 2013; Artaxo et al., 2022). The ever-increasing global demand for cash crops has led to significant land conversion in recent decades, particularly in the tropics and subtropics (Creutzig et al., 2019; Winkler et al., 2021). This is particularly problematic in light of the high susceptibility of tropical soils to soil degradation (Lal, 2015).

While these problems are also seen in small-scale monocultures cultivated by smallholders, their severity increases with the scale of the cultivation. Tropical permanent crops offer higher potential than annual monoculture crops such as maize and rice both in terms of fulfilling important ecosystem services and protecting biodiversity (Thellmann et al., 2017, Cotter et al., 2015).

Another reason for the focus on tropical permanent crops cultivated in large-scale monocultures is the structural weaknesses often encountered in tropical countries (e.g. characterised by a lack of environmental protection legislation or lax enforcement, corruption, a lack of financial resources or unclear land rights). These structural problems can exacerbate the aforementioned environmental problems (Geist and Lambin, 2002), such as the uncontrolled deforestation of primary forests, increased soil erosion and improper use of plant protection products. The environmental issues caused or exacerbated by monocultures also often lead to social problems. The expulsion of indigenous and local populations, forced and child labour and precarious job security are just a few of the many examples in this regard (HRW, 2019; ILO, 2007). Taking the example of palm oil, various studies have found that the expansion of large-scale plantations is frequently concentrated in countries with high levels of corruption and weak enforcement of environmental laws (Azhar et al., 2017; Butler and Laurence, 2008; Obidzinski et al., 2012).

The development towards large-scale monocultures is particularly prevalent in the conventional agriculture sector (Bennett, 2012), but also occurs in organic agriculture (Salaheen and Biswas, 2019, p. 26). The consequence of this is that there are also large-scale monocultures among tropical permanent crops in Bio Suisse Organic operations. To date, the Bio Suisse Standards have not specifically restricted or regulated this development towards large-scale monocultures in the tropics. This is in spite of the fact that the aforementioned negative environmental and social impacts of large-scale monocultures in tropical permanent crops contradict the Bio Suisse mission statement.

The Bio Suisse mission statement envisions agricultural production in harmony with natural cycles and people. In specific terms, this means cultivation in which

- the soil remains fertile and vital,
- robust plants and animals are raised,
- natural materials are used,
- the diversity of flora and fauna and a living ecosystem are promoted,
- social responsibility is assumed for staff and
- fair producer prices are assured.



Figure 1: Bio Suisse mission statement

In the long run, this potential gap between the reality of certain cultivation systems of tropical permanent crops and the Bio Suisse mission statement should be closed.

2 Objective of the vision

The vision takes a long-term perspective. Through it, Bio Suisse is pursuing the following objectives:

- Core elements of the diversified cultivation of tropical permanent crops are defined. Objectives regarding the areas in which services of the future system and the fields of action in which measures are expected in order for those services to be provided are formulated.
- The risks specified in Chapter 1 regarding tropical permanent crops in large-scale monocultures are minimised to greatest possible extent in BSO operations.
- Current and future partners, stakeholders and multipliers such as BSO operations, licensees and consultants know the planned, long-term orientation regarding tropical permanent crops.
- The communication of the vision enables forward-looking and pro-active planning for all operations and partners throughout the value chain in order to implement the vision.

The vision does not define crop-specific cultivation criteria for specific geographical regions. Instead, it describes the elements that should generally be present in diversified cultivation systems.

3 Vision

Diversification and multifunctionality contribute to securing a resilient cultivation system as well as environmental and socio-economic sustainability.

This vision refers to tropical permanent crops that are currently cultivated in large-scale, contiguous monocultures. These types of cultivation systems are not consistent with the Bio Suisse mission statement and should therefore be brought into harmony with it through diversification. Diversification also results in a restoration of the multifunctionality of the cultivation systems. Over the long-term, large-scale, non-diversified monocultures will no longer be used for the cultivation of BSO products.

There are various ways of achieving this transition towards the diversification and multifunctionality of tropical cultivation systems. One way is for large-scale, contiguous monocultures to be replaced by multifunctional, diversified systems. Another option is to divide the large-scale, contiguous monoculture into small, delimited monoculture areas through restructuring. A combination of the two approaches is also possible. These diversified systems generate primarily environmental, but also socio-economic added value. The resilience of future cultivation systems will be enhanced through their consistent diversification and the resulting environmental, social and economic sustainability aspects.

Diversification is a broad concept. To provide clarity, the following section lists various cultivation systems that are regarded by Bio Suisse as diversified cultivation systems. The basis for this list is consultations with certified BSO operations, inspection and certification bodies and representatives of various research institutes, as well as insights from the scientific literature.

This list is not exhaustive. Rather, it will be continually updated and expanded in collaboration with the stakeholders affected by this vision:

- **Polyculture:** Supplementing an existing cultivation system with additional crops (Feliciano, 2019)
- **Mixed farming:** Combination of crop production with animal husbandry (Feliciano, 2019; León and Osorio, 2014)
- **Agroforestry:** Integration of crop production and trees (Atangana et al., 2014; Feliciano, 2019), for example through the integration of tree islands with a reduced cultivation density of the main crop and spontaneous regeneration of the naturally occurring vegetation as per Zemp et al. (2023)
- **Forest patches and tree islands:** Landscape with high forest coverage, where a part of the forest area is contiguous and the rest of the forest coverage occurs in the form of smaller, uniformly distributed patches and semi-natural tree elements such as vegetation corridors (Arroyo et al., 2020; Zemp et al., 2023)
- **Mixed landscapes:** Development of diversified landscapes with multiple ecosystems connected to each other via habitat corridors and diversity islands (Lin, 2011)
- **Increased structural diversity:** Small-structured, delimited monocultures with diversified buffer zones (e.g. other diversified cultivation systems, biodiversity patches)

In order to develop in the direction of diversified cultivation systems, Bio Suisse has defined fields of action and elements that are, in its view, core components of diversified cultivation of tropical permanent crops. These elements are listed in the following sub-chapter and broken down into environmental and socio-economic elements.

Elements of the diversified, multifunctional cultivation of tropical permanent crops

To the extent possible and useful, diversified, multifunctional cultivation systems integrate as many of the following environmental and socio-economic elements as possible. The implementation of certain elements may be contradictory or conflicting, for example in the case of crops in extreme locations: in certain locations, monoculture crops are the naturally occurring system and thus the system best adapted to the location. In such cases, the implementation of selected elements makes sense. It is accordingly important to bear in mind that the implementation depends on the existing biotic and abiotic context. This means that the diversification may be differently configured and the objective or the desired end state may be different depending on the context (what the original and naturally prevalent vegetation is at the location, or whether it is, for example, forest, moorland or savanna).

Figure 2 summarises the environmental and socio-economic elements and shows how consistent they are with the Bio Suisse mission statement. The sequence of elements does not indicate their importance and weighting.

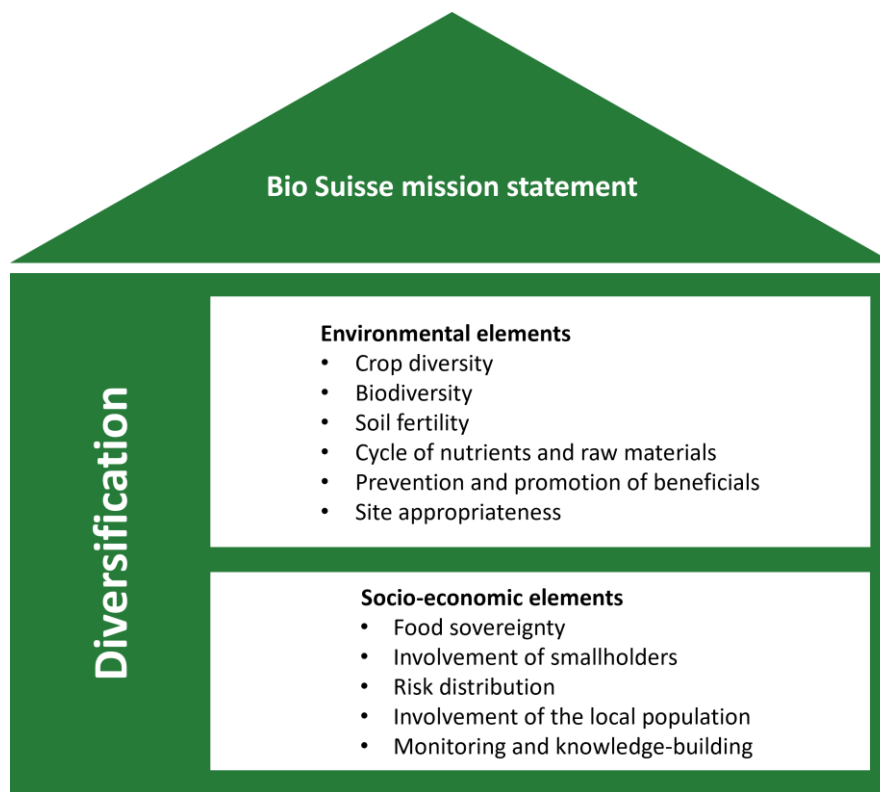


Figure 2: Environmental and socio-economic elements of diversification support the fulfilment of the Bio Suisse mission statement

Environmental elements

Even today (as of January 2023), Bio Suisse imposes extensive requirements on its producers to ensure compliance with environmental sustainability standards, including but not limited to the standards in Part V,

- Chapter 3.5 Clearing and destroying forests and high conservation value areas,
- Chapter 3.6 Water resources management,
- Chapter 4.2 Crop production (specifically 4.2.1 Soil protection and soil fertility, Chapter 4.2.3 Enhancement of biodiversity, Chapter 4.2.4 Fertiliser use, Chapter 4.2.7 Crop protection, Chapter 4.2.8 Burning).

The following environmental elements are core components of a diversified cultivation system, which in some cases are based on or expand on existing standards and in some cases are completely new:

- **Crop diversity:** Tropical permanent crops are cultivated alongside with companion crops and/or combined with livestock. Naturally shaded permanent crops are grown in partially shaded systems.
- **Biodiversity:** Large contiguous and uninterrupted areas under cultivation are avoided by interspersing the total area with forest patches, tree islands, connectivity corridors and individual structures that promote biodiversity.
- **Soil fertility:** Soil fertility is maintained and improved by increasing the bound soil carbon with adapted, specific measures.
- **Cycle of nutrients and raw materials:** Nutrients and raw materials remain in a closed cycle. Organic residues are processed with as few emissions as possible and sensibly used.
- **Water cycle:** The natural water cycle is maintained. Diversified cultivation in the large-scale operation and in the region changes the microclimate in a positive way.
- **Prevention and promotion of beneficial organisms:** Diversification supports the optimal and active promotion of beneficial organisms, which reduces the need for biological plant protection products to combat pests to a minimum. The same applies to protection against diseases caused by viruses, bacteria or fungi: the disease pressure declines due to the changed microclimate and the benefits of smaller cultivation areas.
- **Site appropriateness:** The cultivation of permanent crops is conducted on a site-appropriate basis. The requirements of the selected type and variety is compatible with the local abiotic (such as climate, weather, soil and water) and biotic (such as the surrounding ecosystem, flora, fauna, diseases and pests) conditions.
- **Climate resilience:** A diversified cultivation system helps mitigate global warming (e.g. through consistent CO₂ sequestration) and remains productive and resilient in spite of changing environmental conditions.
- **Conversion and restructuring:** Monoculture areas are divided into small structures and separated from each other by diversified buffer zones. The structural diversity of tropical permanent crops is high.

Socio-economic elements

Even today (as of January 2023), Bio Suisse imposes extensive requirements on its producers to ensure compliance with socio-economic sustainability standards through the standards in

- Part I, Chapter 5.5 Responsible trade practices when importing Bud products,
- Part V, Chapter 3.3 Social responsibility and
- Chapter 3.7 Land grabbing

The following socio-economic elements are core components of a diversified cultivation system, which in some cases are based on or expand on existing standards and in some cases are completely new:

- **Food sovereignty:** In parallel with the cultivation of crops for export, the basic supply of agricultural goods to the local market is promoted.
- **Involvement of smallholders:** Smallholders are included and supported on a self-determined basis.
- **Social responsibility:** The operations meet their social responsibility and create attractive workplaces.
- **Risk distribution:** Diversified cultivation of various crops reduces the financial dependence of the operation on a single, export-oriented crop.
- **Involvement of the local population:** The operation takes account of the requirements of the local population from the outset. It is cognisant of the various environmental and socio-economic

consequences of the operation for the local population and conducts itself in a manner that allows the operation and the local population to co-exist in a win-win relationship. The full implementation of the vision will protect and improve the local population's livelihood.

- **Monitoring and knowledge-building:** Where applicable, local knowledge should be actively incorporated into the planning and implementation of the diversified cultivation system. The exchange of knowledge with other organic and diversified operations enables reciprocal learning. The transition from monofunctional to diversified cultivation systems is monitored: during the implementation phase, selected outputs should be observed in a monitoring process and their impact assessed at the end of the implementation through an evaluation. Observance of the transition via monitoring and evaluation promotes internal and external knowledge-building.

4 Outlook

Bio Suisse will proceed with implementation of the vision both internally and externally (Bio Suisse Partners), with mutual exchange between the two processes.

Bio Suisse will use the vision to define and prioritise objectives and measures. The implementation of the vision by Bio Suisse as an organic standard will proceed primarily through the standards. Measures to be undertaken by Bio Suisse will therefore primarily be in the form of changes or updates to standards.

Bio Suisse wants to undertake the translation of the vision into standards together with its partners and thus invites them to take part in the process. This process includes an active discourse between and the participation of various actors. The discourse between BSO operations, consultants, the scientific community, licensees and Bio Suisse ensures that the implementation will be realistic and context-sensitive. Knowledge is created and transferred through the discourse. The discourse creates the foundation for the further development of the standards as well as the sustainable cultivation of tropical permanent crops in a manner consistent with and exceeding the Bio Suisse mission statement.

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6 Appendix

The two lists show crops that are already cultivated in BSO operations that could be within the purview of this vision. The lists are not complete and will not (for the moment) be published. They are intended only as an aid to reading and as an indication of which crops could be affected.

Not all crops are exclusively tropical crops. Some of them are also cultivated in subtropical climate zones. If tropical crops are cultivated in subtropical regions, this vision and its elements also apply to them.

Limited list:

The following list includes crops for which there appears to be a particularly urgent need for action (either due to their cultivation in BSO operations or a heightened risk for cultivation in large-scale monocultures).

- Agave
- Pineapple (cultivated as permanent crop)
- Avocados
- Bananas
- Cashew
- Coconut
- Mangos
- Oil palms
- Tea
- Sugar cane

More extensive list:

- Açai
- Araza
- Guavas
- Grapefruit
- Ginger
- Jackfruit
- Coffee*
- Cocoa*
- Carambola or star fruit
- Turmeric
- Limes
- Lychee
- Macadamia
- Moringa
- Nutmeg
- Cloves
- Oranges
- Passion fruit
- Pepper, all colours
- Allspice
- Soursop
- Star anise
- Cinnamon

* Coffee and cocoa are mostly produced by smallholders and in these cases are not directly affected by the vision.