Farming without animals?

The outlook for Biocyclic Vegan Agriculture as an alternative approach to food production in Sweden

Kevin Edberg

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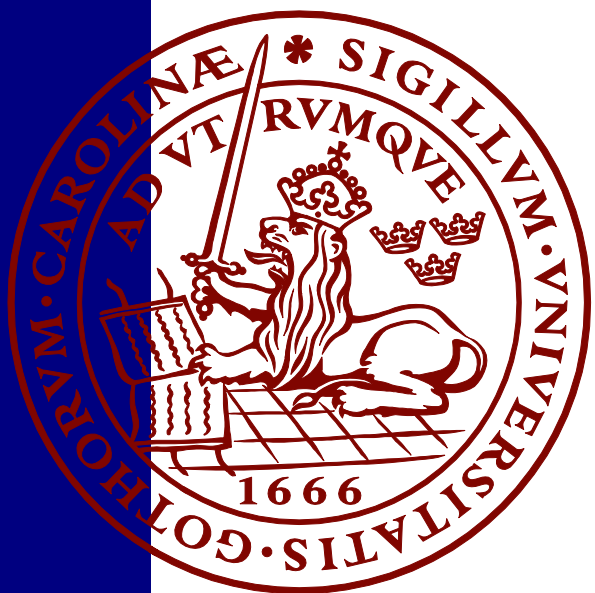

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Supervisor: Elina Andersson, LUCSUS, Lund University

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Abstract

Conventional agriculture and animal husbandry are leading causes of greenhouse gas emissions, environmental degradation, and biodiversity loss. Biocyclic Vegan Agriculture (BVA) is an approach that aims to address the concerns of modern agriculture and provide a sustainable and ethical alternative. Through the heuristic lens of the Multi-Level Perspective, where BVA serves as a potential niche, this study analyzes barriers and opportunities for BVA to break through the socio-technical agricultural regime in Sweden. After interviewing biocyclic vegan farmers and hobby growers, conducting an online survey, and reviewing policy, the findings show that: BVA struggles to solidify as a niche in Sweden, partly due to a failure to expand the network, current shared beliefs on veganism are largely negative, to the point of farmers downplaying the vegan aspect, vegan consumers are generally unaware of but open towards BVA products, and future EU policy prioritizes aspects found in BVA.

Key words: Biocyclic Vegan Agriculture, Sustainable transitions, Multi-level perspective, Swedish agriculture, Biocyclic Humus Soil, Alternative agri-food system

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1 Introduction

The story of modern agriculture has two sides. On the one hand, technological breakthroughs and intensification have enabled the Earth's population to surpass 8 billion people. On the other hand, agriculture is a leading cause of a myriad of environmental and climate related issues, such as deforestation, erosion, biodiversity loss, and high greenhouse gas emissions (IPCC, 2019). A major contributor to the related issues, in particular the latter, is animal husbandry (O'Mara, 2011). Therefore, a (2018) study by Poore & Nemecek suggested that one of the most significant efforts to reduce one's climate and environmental impact is to reduce consumption of animal products and adopt a vegan diet. Similar studies have had the same conclusion (Chai et al., 2019; Menegat et al., 2022; Rabès et al., 2020).

Veganism is more than a diet however, it is a lifestyle based on ethical principles of not abusing nor using animals commercially (Greenebaum, 2012). Recent years have seen an increase in the number of vegans in Sweden (Kantar Sifo, 2021). However, products considered vegan are often fertilized with animal products such as manure or bone meal, especially if they are organic. The current alternative is chemical fertilizers, which can have negative environmental impacts and often rely on fossil fuel for production (Hasler et al., 2015; Smith & Schindler, 2009). Animals are so ingrained in the food system that it is difficult to imagine what a fully vegan and organic food system would look like.

In recent years, a farming approach called Biocyclic Vegan Agriculture (BVA) has emerged. It problematizes the dominant ways of farming, from an environmental and ethical point of view, by opposing animal husbandry and intensified monocropping. BVA proposes a way of farming without animal products, pesticides, or chemical fertilizers. Instead, it emphasizes creating healthy soils, companion and rotational planting, as well as incorporating more habitat for wildlife next to croplands (Biocyclic Vegan, 2022).

With this study I look deeper into how BVA could potentially become more widespread within Sweden. I am interested in how the Biocyclic Vegan Network is operating to create awareness and increase in size, and what potential barriers exist on a structural level in order for BVA to grow as a practice. I do this by applying Frank Geels (2002; 2011) Multi-Level Perspective (MLP) framework where BVA functions as a potential niche trying to break through to the socio-technical regime, being the current agro-food regime dominated by animal and conventional agriculture.

Agriculture is an interaction between natural and social systems, and concerns meeting the needs of future and present generations. This study engages with one of the core questions and research themes

of sustainability science, “How can society most effectively guide or manage human environment systems toward a sustainability transition?” (Kates, 2001, p. 19450). Furthermore, the study of agriculture and food systems transitions are, just as sustainability science (Kates, 2011), very multidisciplinary, including natural, social, and technological sciences. Additionally, sustainability science is problem-driven and solution-oriented (Clark & Dickson, 2003), which is encompassed in this study by defining the problems of conventional agriculture and discussing a potential solution.

1.1 Research aim and questions

Biocyclic Vegan Agriculture is a fairly new and unknown approach, and the number of farmers who practice it are limited. There are studies on the yield of sweet potatoes and tomatoes in biocyclic vegan soil (Eisenbach et al., 2018, 2019), and it is mentioned in alternative food system studies (Hirth, 2021; Mann, 2020). Still, there is a lack of scientific literature on BVA, which I aim to contribute to with this study. The study is placed in a Swedish context due to internal ambitions for the approach to grow in Sweden.

My overarching research question is: What are the obstacles and opportunities for Biocyclic Vegan Agriculture to become an established practice within Swedish agriculture? While most certainly a niche on a European level, BVA is yet to establish itself as a niche on a Swedish level. To answer the overarching question, I pose these sub questions, relating to the three stages of the MLP: Niche, socio-technical regime, and landscape.

- In what ways does BVA work with vision articulation, network expansion, and learning processes in order to solidify as a niche?
- What are the main obstacles and opportunities within the regime level that can hinder or spur the growth of BVA?
- Which current or potential future landscape changes could impact the transition trajectory of BVA, and how?

2 Setting the scene

2.1 The problems of conventional agriculture and animal husbandry

Although modern agriculture gives high yields, it is responsible for environmental and climate related problems that affect our present and jeopardize our future. While estimates vary, research has shown that agriculture and food systems are responsible for 26% of the world's total greenhouse gas emissions (Poore & Nemecek, 2018). On top of this, clearing land for agriculture can lead to deforestation or loss of natural environments, which in turn leads to a loss of biodiversity (Semper-Pascual et al., 2019). Agriculture is a main culprit of habitat fragmentation and destruction, disrupting ecosystems and threatening wildlife (Mullu, 2016). Monocropping exacerbates these issues by creating large swaths of land with just one type of plant present, creating a hostile environment to most species, land and soil based (Altieri, 1999). Monocultures do not create healthy soils (Altieri, 1999), and the intense tillage of modern agriculture degrades and erodes the soil (Heckrath et al., 2005). Poor soil management entails a decreased potential for carbon sequestration in the soil, leading to higher carbon emissions (Abbas et al., 2020).

Furthermore, conventional agriculture requires a lot of inputs, such as pesticides and chemical or animal fertilizers. The overuse of pesticides is a leading cause of the decline in pollinators and other insects (Brittain et al., 2010). It also pollutes the environment and water bodies, negatively impacting biodiversity (Tang et al., 2021). Pesticide use in agriculture creates a resistance in the unwanted organisms, meaning more and more pesticides will need to be applied as time passes, amplifying the negative effects (Hawkins et al., 2019). Many pesticides are damaging to humans and can cause respiratory illness, neurological damage and cancer (Damalas & Eleftherohorinos, 2011). Overuse of fertilizers releases potent greenhouse gasses into the atmosphere (Menegat et al., 2022). Agricultural runoff is a leading cause of eutrophication, which has long and lasting negative effects on water bodies (Smith & Schindler, 2009).

Livestock provides 15% of the world's calories, and roughly 30% of the world's protein. At the same time, 80% of global agricultural land is used for feed and fodder production or grazing (Herrero et al., 2015). This makes animal agriculture a rather inefficient use of space. Furthermore, one estimate puts livestock responsible for 18% of anthropogenic GHG emissions (O'Mara, 2011). This includes the release of extra potent greenhouse gasses, as in methane and nitrous oxide. Globally, animal agriculture is a leading cause of deforestation (Herrero et al., 2015; IPCC, 2019). It can also lead to land degradation caused by overgrazing (Fetzel et al., 2018), and ill treated manure pollutes nearby wildlife and water sources (Kumar et al., 2013). Additionally, farmed animals are being supplemented with large amounts of antibiotics, leading to an increasing resistance to antibiotics in the general public, and could have serious future health implications (Mathew et al., 2007).

There are also several ethical issues with animal agriculture. One issue is that of exploitation. From a vegan perspective, using animals for food production degrades them to resources rather than living sentient beings, leading to an exploitative relationship (Greenebaum, 2012). Vegans also object to the suffering and sometimes gruesome practices occurring within the animal agricultural system (Anomaly, 2015).

2.2 Agriculture in a Swedish context

Agriculture accounts for 1.3% of Sweden's total GDP (World Bank, 2021). Roughly 3 million hectares is classified as agricultural land, with 85% arable land and 15% pasture (Swedish Board of Agriculture, 2022). The largest share of the arable land, ~1.1 million hectares, is used for growing ley and fodder crops, and the second largest share, ~1 million hectares, is used for growing grains (Swedish Board of Agriculture, 2022). Conventional agriculture is relatively dominant in Sweden, but 18% of all arable land (470 000 hectares) was used for organic farming in 2021. This land is very dependent on animal manure. There are around 59 000 farms in Sweden (European Commission, 2022). 45% of farming enterprises have operations of 10 hectares or less, while 11% have operations of 100+ hectares (Swedish Board of Agriculture, 2022). The average size, however, is roughly 50 hectares (European Commission, 2022). The production value of foodstuff in Sweden is dominated by animal agriculture, as the two largest groups are meat (18%) and dairy and eggs (16%) (Swedish Board of Agriculture, 2022), meaning the animal sector plays a big role in Swedish agriculture.

2.3 Biocyclic Vegan Agriculture as an alternative approach to food production

As briefly defined by The International Biocyclic Vegan Network, “Biocyclic vegan agriculture means purely plant-based organic farming. This form of cultivation excludes all commercial livestock farming and slaughtering of animals and does not use any inputs of animal origin" (Biocyclic Vegan, 2023b). While this description provides a basic understanding of BVA, there are more components that distinguish BVA from other forms of agriculture. For instance, soil health and soil fertility is central to BVA. In the absence of chemical fertilizers and manure, the main strategy to create healthy and fertile soil is to increase the humus content of the soil. Humus, an organic and dark material formed in the soil by the decay of organic matter, has many attributes that make it suitable for agriculture. It contributes to better aeration and water retention of the soil (Biocyclic Vegan, 2022). It has a high concentration of microorganisms, enhancing soil life. Humus acts as a carbon buffer, as it has a high carbon content (40-60%), and can therefore potentially act as a carbon sink (Biocyclic Vegan, 2022). Lastly, it acts as a “nutrient battery”, with a long and balanced nutrient supply. The nutrients are not

water soluble, meaning there is little risk for nutrient leaching (Biocyclic Vegan, 2022) Studies have also shown increased yields in cases of sweet potatoes and tomatoes planted in biocyclic humus soil, with 20% and 45% higher yields compared to chemically fertilized soil (Eisenbach et al., 2018, 2019). Thus, much of BVA is centered around creating new humus soil by adding a lot of organic matter and compost to croplands.

Other components encouraged in BVA are companion, rotational and cover planting, as well as planting nitrogen fixers in the form of legumes at least once every four years (Biocyclic Vegan, 2022). The approach also requires some form of semi-natural ecological compensation areas to be placed in the proximity of the croplands, to increase biodiversity (Biocyclic Vegan, 2022). This could include planting bushes or hedges, creating wetlands or other biotopes, or creating wildlife corridors between habitats (Biocyclic Vegan, 2022). BVA shares a lot of attributes with similar agricultural practices, such as regenerative agriculture, agroforestry, and permaculture, to the point where the latter two are mentioned as methods to increase biodiversity in The Biocyclic Vegan Standard (Biocyclic Vegan, 2022). While a lot can be said about differences as similarities between the different approaches, the two main factors that differentiate BVA is the total exclusion of animal products, and the focus on humus soil.

2.3.1 The Biocyclic Vegan Network and Standard

The International Biocyclic Vegan Network acts in many ways as the official face of BVA, providing definitions and related scientific literature on the subject. The network also states a mission for BVA, which includes promoting “animal rights and a vegan way of life” (Biocyclic Vegan, 2023b). The network’s objective is to “establish and promote a sustainable, closed loop and vegan oriented form of organic farming by introducing the biocyclic vegan principles in all areas of agriculture and food production.” (Biocyclic Vegan, 2023b). Extra importance is given to “the protection of the environment, nature and climate as well as animal ethics, health and world nutrition without recourse to animal husbandry” (Biocyclic Vegan, 2023b). The network advises farmers on how to convert to BVA, and aims to raise public awareness on its benefits. The network also participates in research projects on soil fertility and the use of biocyclic humus-soil (Biocyclic Vegan, 2023b). National networks also exist, for example in Greece, Germany and Sweden.

The Biocyclic Vegan Standard is an International Federation of Organic Agriculture Movements (IFOAM) approved organic standard by which a farmer can get their products/operations certified. It requires farmers to follow the methods mentioned in the previous section, along with more specific production criteria. Many of the guidelines revolve around soil management methods. Different kinds of

production can have slight variations in the guidelines, as conditions can vary. There are currently 21 certified farms as of May 2023. The majority of the farms are in Europe, but there are also farms in Canada and Colombia. Different types of certified farms vary from horticultural ones producing vegetables and herbs, to cereal farms, fruit plantations, and vineyards. Being certified means you can sell your produce with the biocyclic vegan label on them. BVA produce is sold through various markets, including grocers, food processors, restaurants and directly to customers (Biocyclic Vegan, 2023a).

3 Theoretical framework

3.1 Multi-level Perspective

The Multi-Level-Perspective (MLP) is a theoretical framework originally developed to analyze technological transitions, defined as "major technological transformations in the way societal functions such as transportation, communication, housing, feeding, are fulfilled" (Geels, 2002, p. 1257). These transitions do not solely include changes in technology, but also changes in the spheres of regulation, user practice, infrastructure, industrial networks, and symbolic meaning (Geels, 2002). While initially focused on historical technological transitions (Geels, 2002), the MLP has become a popular framework for analyzing "sustainable transitions", e.g. in mobility, bioenergy and organic food (Geels, 2011). Technological transitions are conceptualized as outcomes of interlinkages between developments on the three different levels of an MLP: niche, (socio-technical) regime & (socio-technical) landscape (Geels, 2002). These levels are central to the MLP, and interact with each other. Interactions can solidify current technological pathways, or create conditions for new ones to expand. While the conceptualization of the framework gives the appearance of a hierarchical system, the levels do not necessarily represent hierarchies. Instead, they are to be understood in terms of degrees of structuration of local practices, which in turn relates to scale and number of actors reproducing regimes/niches (Geels, 2011). In other words, they refer to degrees of stability, where the niche is the least and the landscape is the most stable. Before going into more detail about the framework, the three levels of the MLP must be described and characterized.

The regime-level is central to the MLP, since transitions are defined as regime shifts (Geels, 2011). The socio-technical regime is what constitutes the "deep structure" of a socio-technical system (Geels, 2011). Broadly defined, it is the set of semi-coherent rules which orient and coordinate activities within the social groups which reproduce the various elements of the socio-technical system (Geels, 2011). These rules, functioning both as the medium and outcome of action, vary in their form and implementation, ranging from hard set rules to "softer" rules. Examples of these rules include routines and shared beliefs, lifestyles and user practices, capabilities and competences, institutional regulations and arrangements, and legally binding contracts (Geels, 2011). Regimes are characterized by lock-in mechanisms, in the form of sunk investments in infrastructure and machines. These lock-ins can make transitions harder, since they incentivise the regime to keep its course. Political lobbying, shared beliefs, and institutional commitments also stabilize existing systems. This creates a path dependence, making it more difficult to displace existing systems (Geels, 2011). This lock-in and stability also means that technological innovation happens incrementally, amounting to minor adjustments with a stable trajectory. The socio-technical regime as a concept can also include "sub-regimes", and the

coordination between them. Alignment between sub-regimes can provide stability to the regime, or create tensions which destabilize it (Geels, 2011).

Niches are sometimes described as protected spaces, as in R&D laboratories, demonstration projects with subsidies, or smaller market niches for users with special demand and are thus willing to support the innovation (Geels, 2011). Actors within niches, ranging from entrepreneurs and start-ups to activists and social groups, work on radical innovations which diverge from the existing regimes, hoping they replace or integrate with the regime (Geels, 2011). There are several factors that can create a "mismatch" between the niche and regime, including regulations, lack of fitting infrastructure or consumer practices (Geels, 2011). There are also power dynamics at play which can dissuade transitions. Three core processes have been identified within the literature on niche innovation (Geels, 2011). The first one is the articulation of visions and expectations, guiding innovation activities, and attracting attention and potentially funding from external actors. The second one concerns the creation of social networks, and thus the recruitment of more actors, expanding the resource base of the niche. The third process encompasses learning and articulation on different dimensions, including organizational issues, user preferences, infrastructure requirements, policy instruments and symbolic meanings. In order for a niche to gain momentum, its expectations have to become more precise and broadly accepted, the different learning processes should lead to a stable configuration or design, and the network should grow larger and potentially include powerful and legitimate actors (Geels, 2011).

The (socio-technical) landscape is a broader context, and influences dynamics both at regime and niche levels. It includes a wide range of elements, including demographic trends, societal values, political ideologies, and macro-economic patterns. (Geels, 2011). Changes at landscape level usually occur at a slow rate, although certain events can inflict changes at a faster rate, e.g. wars, accidents, financial crises or price shocks (Geels, 2019). While landscape changes are crucial to enable sustainability transitions, they can, and often do, have the opposite effect, and stabilize existing regimes (Geels, 2011).

Although the different levels are defined and conceptualized separately, the MLP is primarily a way of analyzing the interlinkages and interplay between the levels, as these interactions create transition/stabilization pathways (Geels, 2011). These interplays vary depending on technology and location. There is however a general multi-level dynamic that can create transition pathways. It starts with the niche building up internal momentum. This, along with potential landscape changes, creates pressure on the regime and system. The pressure destabilizes the regime, creating a window of opportunity for the niche to break through (Geels, 2019). This is not a guaranteed transition pathway,

and it should be noted that actual technological transitions are rare. Many niches do not manage to break through even though the regime is destabilized (Geels, 2019).

3.2 Multi-level Perspective in Agri-food systems

While the flexibility of the framework has led to a wide usage, it has also created a need for researchers to conceptualize the MLP to fit their chosen system to study. Although Geels brings up agri-food systems as an example of where to apply an MLP on multiple occasions (Geels, 2002; Geels, 2011; Geels, 2019), agri-food systems tend to be overlooked within sustainable transition research (El Bilali, 2019). For these reasons I dedicate this section to further discuss the MLP in the context of agri-food systems, which in turn will further guide my operationalization and conceptualization of the framework in relation to my research questions.

The regime level in an agri-food system mainly refers to conventional, intensive and industrial agriculture and the rules and practices it follows (El Bilali, 2019). Regime elements include business codes and regulations, existing business networks, food safety laws, logistics and infrastructure (Hinrichs, 2014). Agri-food regimes can include key government actors, institutional structures within the agricultural sector, political discourse on agricultural development (Järnberg et al., 2018). In previous agri-food transition research, the focus has largely been on regulative rules (e.g. policies, regulations), while normative and cognitive rules (e.g. shared beliefs, visions, culture and discourses) have been left out or underdeveloped (El Bilali, 2019).

When discussing the niche level in this agri-food MLP, I broaden the definition of what is a niche. While the word technology has certain connotations related to tech, machinery, products, or automation, niches within agri-food systems often lack these. The most notable change is the manner of production, which is often less reliant on automation and machinery. In most cases, agri-food scholars refer to alternative agri-food systems (permaculture, agroecology) when mentioning niches (El Bilali, 2019) Hence, perhaps focusing on the terms “practice” or “approach” rather than technology provides a more accurate description (Darnhofer, 2015).

Landscape factors analyzed in agri-food MLPs are mostly consistent with those in other systems, ranging from globalization, population growth and neoliberalization, to financial crises and soaring energy prices (El Bilali, 2019). Nevertheless, there are calls for not only considering the socio-economic landscape, but also the biophysical landscape in the form of climate change, soil fertility and arable land availability (Lutz & Schachinger, 2013).

3.3 Operationalization

The elements in MLP frameworks range from straightforward and tangible, to more diffuse and intangible. I therefore dedicate this section to how I operationalize the MLP in this case. This includes putting the different levels in the Swedish agri-food system context and defining these, as well as defining the elements and concepts in this context. Operationalizing the framework will in turn shape the methods and results of this study, as it dictates what is brought up and analyzed.

I identify conventional and animal agriculture as the system which the regime keeps in place. As mentioned in section 2.2, a majority of farmland in Sweden is conventional, and meat and dairy have some of the biggest sales and production values. However, as regimes often are presented as too homogeneous (Geels, 2011), I have also placed organic agriculture as a sub-regime. While the two differ, mostly in terms of inputs and outputs, they also share some similarities. For instance, they are largely based on monocropping, and animal husbandry is common in both. Furthermore, organic farming has been established for a long time, and with a steady and large share of the market I argue it should no longer be considered a niche in a Swedish context.

The regime consists of rules, formal and informal, including routines and shared beliefs (Geels, 2011). I analyze these routines and shared beliefs by identifying some of the narratives and discourses described by the interviewed farmers in relation to conventional/organic farming and BVA. The rules include lifestyles and user practices, which I partly analyze by looking at consumer behavior of vegans through a survey. Existing infrastructure is also considered. Another set of rules are institutional regulations and arrangements, as well as legally binding contracts. To analyze these, I look at agricultural regulations, policies and targets, both on a national and EU level, in order to gauge their compatibility with BVA.

A niche does not exist on its own. It is supported by niche actors, niche shared beliefs and infrastructure. In other words, when a niche grows, so too does the amount of niche actors, and the extent of the shared beliefs. When analyzing the niche, primarily through interviews, I mainly focus on the core niche processes described in section 3.2. Concerning vision and expectation articulation, and the attraction of external actor attention, I pay attention to how the niche (through its actors) expresses goals and visions, and the contact and communication with external actors. I also analyze how the niche works with increasing the number of actors involved and create networks. Furthermore, I look at the niche's learning and articulation processes in terms of design, infrastructure requirement, organizational issues and policy instruments. I analyze the niche's learning moments with external actors, as well as the niche's understanding of existing obstacles and opportunities at organizational and political domains. Lastly, I scope some of the perceived and experienced practical obstacles and opportunities, which may impact the overall attractiveness of the niche.

The landscape includes elements of demographic trends, changes in societal values, and macro-economic patterns. While such broad trends can be difficult to analyze, I focus on the current economic situation in Sweden as a macro-economic pattern, as in the case of inflation. The landscape also concerns shocks, including wars, accidents, or price shocks. Here I analyze the potential impacts of the high energy and living costs that have emerged since 2022, in part due to the current war in Ukraine. These impacts could range from price increases and decreased availability of essential resources, or a change in consumer behavior. Lastly, the biophysical factors, e.g., climate change, are considered as well. In figure 1, these conceptualizations are made clearer by the adaption of Geels visualization of the MLP (Geels, 2019), applied to the parameters of this case.

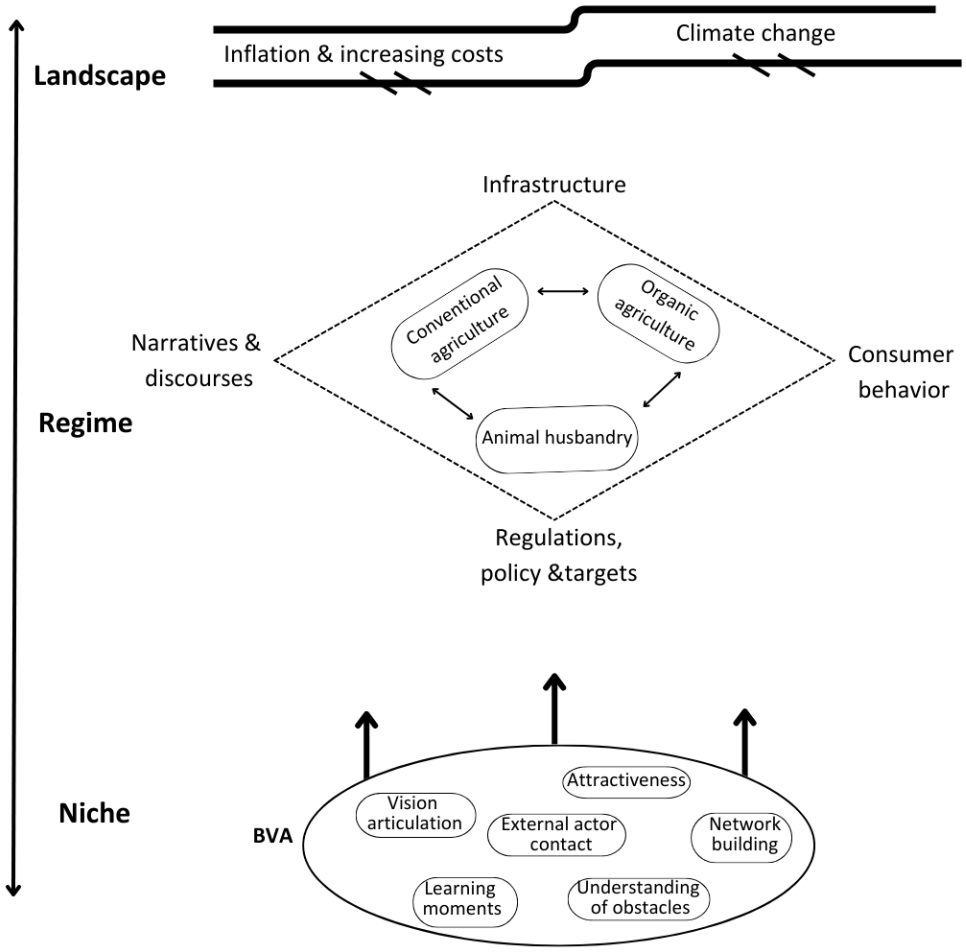

Figure 1. Conceptualization of the operationalization of the MLP in the context of this thesis, covering important factors on niche, regime, and landscape levels. Own illustration, based on the visualization from (Geels, 2019).

4 Methods

To answer my overarching research question and subsequent sub-questions, I apply three different methods of collecting data. This is done to provide a more holistic view of the topic, and by combining methods there is a smaller risk of important information being left out. It also allows me to produce complimenting types of knowledge, based on experience, quantitative data, and societal structures. The methods are: Semi-structured interviews, online survey, and policy review, all of which are described in detail in section 4.1, 4.2 and 4.3 respectively.

4.1 Semi-structured interviews

Semi-structured interviews are a good way of getting first hand experiences and opinions from a research subject and allows for both predetermined questions and spontaneous follow ups (Brinkmann & Kvale, 2018). I conducted a total of seven interviews to get insights into the experiences and views of (biocyclic) vegan farmers and growers. I differentiate between those who rely on the income of their produce (farmers) and those who grow food primarily for themselves/their family, without entirely relying on it for subsistence (growers). As vegan agriculture is not a common practice in Sweden, I sought anyone who practiced it, regardless of the size of their operations. I conducted five Swedish interviews, including with the Swedish BVA network leader. To complement, I contacted European BVA farmers working on a larger scale. I interviewed a British former dairy farmer who transitioned to BVA, and a Belgian BVA farmer. For a full list and specification of the interviewees, see table 1. All interviews were conducted via video chat through zoom, and lasted between 45-90 minutes. They were transcribed using the service Sonix, and manually corrected. To analyze the interviews I coded the content through the coding program NVIVO. I used a deductive approach (Skjott Linneberg & Korsgaard, 2019), and used the categories identified in section 3.3 operationalization, in relation to the levels niche, regime and landscape to formulate my predetermined questions. When referenced in text, the interviewees are referred to by number of conducted interview, e.g. (Interviewee #1).

Table 1. Interviewed subjects by order of conducted interview, and their description.

Classification	Extent	Country	Total farm area	Production orientation
Vegan*	Farmer	Sweden	0.2ha	Horticulture
Vegan*	Grower	Sweden	60sqm	Horticulture
Vegan*	Grower	Sweden	150sqm + 0.13ha	Horticulture + Agroforestry
Vegan*	Grower	Sweden	30sqm	Horticulture
BVA**	Farmer***	Sweden	1.1ha	Horticulture
BVA	Farmer	UK	134ha	Cereal
BVA	Farmer	Belgium	7ha	Horticulture

***** All vegan farmers and growers also adhered to organic principles, but none were certified hence the denomination "vegan"
****** This person is currently in the process of becoming BVA certified, and adheres to the Biocyclic Vegan Standard
******* This person does not rely on selling produce for income, but does sell some produce, and has plans to start a cooperative farm

The principles of reciprocity and reflexivity guided the interviews, since engaging with the subjects and seeking clarification, as well as reflecting on and potentially changing the questions can lead to more accurate data (Galletta & Cross, 2013). In practice, this meant that I started out with a set of questions, which were later changed or adjusted as the interviews went along and I got a clearer understanding of the topic and the subjects. It also meant that the interviews differed to an extent depending on what was brought up by each individual, as the reciprocity allowed me to further explore certain themes in some interviews.

4.2 Online survey

As BVA is a relatively new concept and there are few BVA labeled products on the market, data is hard to come by. I thus decided to create and distribute an online survey, in order to capture consumer perspective on BVA. Since BVA is in its essence an animal rights movement, non-vegans were not deemed to be the primary consumer of BVA products. The survey was distributed via local and national vegan Facebook Groups. In total, 99 people responded, with 91% identifying as fully vegan, and the rest as vegetarian or omnivores. The results of this survey are meant to give an indication as to how the potential largest consumer group views BVA (by itself and in relation to organic products). A couple of questions were also added to aid other parts of the analysis. For a full list of questions, see appendix II.

4.3 Policy review

The last data gathering method was the policy review, motivated by covering a crucial part of the regime level within the MLP. Regulations and policy play an important role in shaping and maintaining a socio-technical regime. Konefal (2015) argues that the role of governance is often underdeveloped within MLPs. When it comes to agrifood system regulations and policy, the EU is a big actor. It is a major financier of farmers throughout the EU, and in many aspects sets the political agenda for member states to follow. However, the member states, in this case Sweden, also set their own agricultural targets and policies. In order to get a comprehensive understanding of the policies and regulations, the review consists of policies on both EU and national levels. The full list of policies included in the review can be found in Table 2. The selected policies were chosen based on their connection to BVA, e.g. organic agriculture, biodiversity, soil health etc. It is likely that more policies are relevant to the potential transition for BVA, but these policies were chosen as their relevance was apparent at an early glance. When reviewing the policies, I searched for key issues that I could relate to BVA, directly or indirectly. Examples include pesticide and fertilizer use, carbon farming, soil health, subsidies for sustainable and/or organic farming methods, and diets. Both phrasings and potential economic support were considered.

Table 2. Policies included in policy review and their level of application.

Policy	**Level**
EU Biodiversity Strategy for 2030	EU
Farm to Fork Strategy	EU
EU Soil Strategy	EU
Action plan to increase production, consumption and exports of organic food products	Sweden
Sweden's Strategic Plan for the Common Agricultural Policy 2023-2027	Sweden

5 Results and discussion

In this section I present and discuss the results of the empirical investigations, guided by the theoretical framework, other MLP studies of agri-food systems, as well as other studies relevant to the subject. In addition to answering the RQs, I end the section with a discussion of the sustainability aspect of BVA, in relation to the regime.

5.1 Attributes and flaws for BVA to solidify as a niche in Sweden

To gauge the potential of a niche to solidify and/or grow, certain factors must be analyzed. As mentioned in section 3.3, these include vision and expectation articulation, contact and communication with external actors, network building, learning moments, understanding of obstacles on organizational and political domains, as well some practical obstacles or opportunities of the practice itself.

Vision and expectation articulation was analyzed from two perspectives. One is what the niche actors are communicating outwards, for example on websites and social media. On its official website, the Swedish BVA network shares the same overall vision as the mother organization, namely to "establish and promote a sustainable, closed loop and vegan oriented form of organic farming by introducing the biocyclic vegan principles in all areas of agriculture and food production" (Biocycklisk vegansk odling, n.d.). No further articulations of visions and expectations is present in any of the official channels of the network, including on social media. In fact, the network's own social media channels have been inactive for around one year, and previous engagement has mostly been centered around information sharing, with a limited outreach and engagement. This could be a major obstacle to increase the amount of network members, and ultimately niche actors. Niches gain momentum if expectation becomes clearer and more widely accepted (Geels, 2011). A lack of these factors could pose a barrier for BVA to solidify as a niche in Sweden.

The other perspective captures the thought processes and visions of the individual actors, which became apparent during the interviews. For instance, an aspiration expressed by almost all interviewees is a strong desire to showcase vegan farming practices as a solid and viable way of growing food. This is done either through social media or real-life interactions. The Swedish biocyclic farmer and network leader expressed a form of ambivalence towards their vision for BVA in Sweden. For them, the vegan farming started out as a "political project", with a vision of changing society as a whole. On the other hand, in order for BVA to grow as a movement and be perceived as something serious and legit, there is also a desire to commercialize it.

But now, unfortunately, I think that the fastest way is to make a profitable capitalist product to make it seem legit, and … to get more people to farm vegan. But preferably I want to… It started as a grassroots movement and somewhere we have our foot in both [camps] … and it's a bit difficult to get both. That's why I've been [thinking]: should I continue now as I do, or should I take out a loan and make a product? (Interviewee #5).

It is common for niche actors to find themselves in a position of being both "in" and "against" the market simultaneously (Feyereisen et al., 2017). Huybrechts (2012) makes the point of the fair trade movement actors who " . . . wish to use market mechanisms as a tool to increase their social impact, but at the same time promote a political project that questions the functioning of the market" (p. 17). Further, a high diversity of niche actors can have an impact on internal niche processes, as different actors have different worldviews, motivations, and sentiments (Davidson et al., 2016). For instance, Vivero-Pol (2017) showed how normative values on food (e.g. food as commodity vs. food as commons) shapes transition trajectories. She concluded that the former view correlated with a gradually reforming attitude, whereas the latter correlated to a counter-hegemonic transformation. Keeping a "foot in both camps" could thus prove difficult in the long run for BVA in Sweden, as the different camps could lead to different transition trajectories, i.e. reform vs counter hegemony. The Swedish biocyclic farmer has plans to start a cooperative farm, which is leaning towards the counter hegemonic side, but also expresses their wish for other actors to start selling BVA products in supermarkets.

Contact and communication with external actors can take different forms and have different purposes. External actors can range from interested media to potential investors or interest groups. In the case of BVA, this contact has primarily been media related. For instance, the Swedish biocyclic farmer has featured in different forms of media, including articles in magazines and newspapers, and podcasts. Furthermore, the British farmer who converted from a dairy farm to a biocyclic vegan cereal farm gained a lot of media attention in the UK, including two features in the BBC. Aside from the received media coverage, there seems to be a lack of communication with other important external actors, including interest groups, researchers and policymakers. This is essentially a barrier for BVA to solidify as a niche in Sweden.

Network creation is an essential part of increasing the amount of niche actors. In the case of BVA in Sweden, there have been difficulties in growing the network. All interviewed Swedish vegan growers/farmers have been in some sort of contact with the network leader, and most of them have attended at least one official network meeting. Despite this, none of them fully abide by the BVA standard, and only one grower is a network member (members pay a fee and partake in network meetings). The Swedish biocyclic farmer claims the strategies used so far to get more members, primarily based on knowledge sharing through courses and social media, have failed, partly citing a

lack of interest among vegans and environmentalists. They describe the lack of members as a state of crisis, and that more active members are needed for workload sharing. The current methods for network creation include information sharing through various online channels, such as environmental, vegan and permaculture groups on social media. The other method of network creation can be seen as a part of the learning moments.

The Swedish biocyclic farmer offers different kinds of learning moments and events. For instance, there is a guided tour of the farm and lectures and workshops on topics related to vegan farming, advertised on the farmers own web page. In addition, each summer an estimated 100-150 folk high school students from a nearby agricultural school visit the farm through study visits. Still, the majority of the interviewed farmers and growers pointed out an overall lack of knowledge among producers concerning farming without manure and chemical fertilizers, and soil biology in general. Some of the interviewed growers pointed out that they had used animal manure before they made the switch to fully vegan agriculture, as they thought that was the only way to farm organically. Due to the central role of soil health and fertility in BVA, an increased soil literacy among farmers could thus facilitate a transition to BVA.

Regarding the understanding of obstacles at the organizational and political domains, the niche through network leader shows an understanding of some of the more apparent obstacles. One of them, as mentioned, is the lack of active and participating network members, which at its core is an organizational issue. Another understood obstacle lies within the certification process. Both the Swedish and British BVA farmers state that one of the biggest challenges in getting certified is finding an auditor for the certification procedure. There is as of May 2023 no capable auditing actor in Sweden. Without an approved auditor, it is not possible to receive your BVA certification. To become a certified auditor, you need to have gone through training from the Biocyclic Network. The Belgian farmer, however, did not view this as an obstacle, as they brought in an auditor from neighboring Germany without much trouble. Both the Swedish and British farmers cite costs as an obstacle to doing the same thing.

For a niche to draw more actors, it has to be attractive (Geels, 2011). In the case of an agricultural practice, it has to appeal to those who grow the crops. Certain elements of a practice can serve as obstacles or opportunities in attracting new actors. The very specific guidelines of BVA, which is mentioned in some interviews as an indicator of legitimacy, can also turn away farmers who use methods which are not allowed. For instance, most of the interviewed vegan growers use forms of fertilization not permitted by the biocyclic vegan standard. This includes human urine, “bokashi tea” (compost water), and other forms of water diluted nutrients, since BVA is primarily focused on

increasing the biocyclic humus content of the soil, rather than providing the crops with nutrients directly. Getting enough organic material to sustain production could be challenging. For instance, the Swedish biocyclic farmer uses all of their 1.1 hectares for the production of crops, but only roughly 0.3 hectares is cultivated cropland. Increasing cropland could lead to (approved) off-farm material being brought in, increasing costs. Another potential obstacle is the requirement of natural environmental features and "ecological compensation areas" (hedges, bushes, wetlands etc.) needed to become certified. For those who do not already possess such areas, implementation can be costly and lengthy, and infringe on existing cropland. However, when scaling up a niche there is a risk of losing or diluting some of the niche values (El Bilali, 2019). Pant (2016) uses agroecology as an example where there has been a struggle between upscaling the niche and losing its core values and principles. In other words, strict guidelines could exclude potential new farmers, but loosening those guidelines could undermine the values of BVA.

There are some practical opportunities too. Due to the high levels of biocyclic humus soil, the need for weeding and watering was, according to the Swedish biocyclic farmer, lower than before the conversion to BVA. Fewer fungal attacks were reported by the British biocyclic farmer compared to before they converted. BVA is the only vegan organic standard which allows a transition period for animal farmers to become biocyclic vegan farmers. This means that during a two-year period, a farmer is allowed to sell equipment in order to fund the transition into a fully BVA system. The British farmer claims this was a major factor for them to join the biocyclic vegan network and ultimately become certified. The other vegan organic certification scheme in the UK, *Stock Free Organic*, does not allow this. The same farmer mentions freedom as an important aspect. Having previously been a dairy farmer, they had reportedly not been able to leave the farm or take vacations for any longer periods of time. As a dairy farmer they express that "There's only literally 2 to 3 hours in the middle of the day when things are sort of quiet, and then you're back into the routine again" (Interviewee #6). Without the commitment to livestock, they have time to visit friends and family, study and see things they did not have time for previously. This is not exclusive to BVA and could be applied to any non-animal form of agriculture. Nevertheless, it could serve as an argument for farmers to transition away from animal agriculture, which is an important part of the transition.

5.2 Potential obstacles and opportunities for BVA to transition to the socio-technical regime in Sweden

To identify the barriers and opportunities within the socio-technical regime, I look at *shared beliefs and routines*, in part found in prevalent narratives and discourses. I also look at *lifestyle and user practices*, *existing infrastructure*, as well *as agricultural policies, targets and regulations*.

One of the largest barriers within the regime can be found in the *shared beliefs and routines*. Veganism is, according to the farmers/growers, still frowned upon by a large number of people. Many of the interviewed farmers/growers had at some point downplayed the vegan aspect of their operations. Either through avoiding the term "vegan" and instead opting for something like "plant based" or "without animal input", or by omitting it completely in certain situations. One vegan grower mentioned people seemed more interested when framed in a way of "*growing with plant-based materials or growing with plants*" (Interviewee #2). The Swedish vegan farmer said that they market their produce as "*poison-free*", and only mention the vegan aspect sometimes, since people can be "*angry*" at vegans (Interviewee #1). The same farmer is not interested in becoming BVA certified and having their produce labeled vegan, as they are not sure it will be beneficial. In a hypothetical situation they mention that "*If I would have had this farm 20 minutes outside of Stockholm, I would not hesitate for a second [to become certified]..."* (Interviewee #1). This also shows a discrepancy between the shared beliefs in the bigger cities and in more rural areas. Another vegan grower, who had been asked to talk to forums and media about their garden due to its biodiversity attributes, shied away from mentioning the vegan aspects of the garden as to not alienate their audience. The British farmer mentions that they received a lot of negative responses from fellow farmers when converting. They recall one moment when releasing their cows to an animal shelter, where local farmers had harassed and mocked the sanctuary owner. Even within other niche groups, such as permaculture and regenerative agriculture, the Swedish biocyclic farmer mentions being questioned and criticized when bringing up BVA. Freeman (1992) argues that public support is important for green innovations to succeed. From a structuralist perspective, a shift in belief systems, ideologies and public opinions is a core process for transitions, since it can influence consumer preferences and values, and put credible pressure on policy makers (Geels, 2010). With veganism being such a divisive, and still relatively unpopular movement, this means that the current shared beliefs and narratives on veganism is an important barrier to overcome.

The shared beliefs and routines go beyond the criticism and skepticism towards veganism, as many growers and farmers mentioned narratives among farmers of how things are and should be. As mentioned before, many growers used animal manure when they first started growing, even though they identified as vegan at the time. This was because they thought this was the only way to grow organically. They mention many farmers think animals are a necessity for a closed nutrient cycle. Radical niches can suffer from what is called the "liability of newness", which can make people perceive as strange, unfamiliar or unreliable, ultimately reducing its sociocultural legitimacy and acceptance (Geels, 2019). In this case, farming using solely plant material may succumb to the liability of newness. Many of the growers and farmers also mentioned a common narrative they would often hear or read as an argument against veganism and vegan agriculture. The notion of grazing cows to keep our

landscapes open and our meadows biodiverse is according to a majority of the growers and farmers ingrained into the minds of most Swedes. The Swedish biocyclic farmer even argues that it is connected to the national identity to most Swedes, and that many would have a hard time accepting an alternative. One grower mentions one of the largest dairy companies in Sweden, Arla, as playing a major role in spreading this narrative.

Concerning *lifestyle and user practices*, there are certain aspects of extra relevance. For BVA to grow as a niche, the Swedish biocyclic farmer argues it would need labeled products on the market, and for this there needs to be a consumer base. Since there are no labeled BVA products on the market in Sweden as of May 2023, I gauge the potential user base. While BVA does not necessarily cater exclusively to vegans, based on already mentioned shared beliefs and since BVA is in many ways an animal rights movement, one might assume vegans will be a primary consumer. The vegan and the biocyclic vegan farmer, who were the only interviewees in Sweden who commercialized their produce, both mentioned that local vegans and animal rights groups appreciated their practices and produce. However, they also had many non-vegan customers, which were attracted by the locally and organically produced aspects.

The number of vegans in Sweden was almost 2% in 2021 (Kantar Sifo, 2021). While it is hard to predict the percentage in the future, it is not unlikely it will increase, as it has in recent years (Kantar Sifo, 2021). However, it is not given that a larger number of vegans will lead to a larger consumer base of BVA products. The Swedish biocyclic farmer argued many vegans are unaware of BVA as a practice and are not concerned about the production of the food they eat. Findings from my survey gives some more insight into this.

A large majority (85%) of the 99 respondents do not know what BVA is, while others are more or less aware of the concept. Nevertheless, a majority (81%) of respondents do mind the fact that the organic food they eat is produced with animal products, and many (72%) see the need for organic food produced without animal inputs. Furthermore, a large majority (90%) of respondents think it is either very or pretty important to buy food and produce with a smaller impact on the environment and climate. When asked which factor is the most important when buying food (organic, local, in season, other), organic had the most responses (33%). Interestingly, while most people do not know what BVA is, when given a brief description and asked whether they would consider buying BVA produced food, almost everyone (90%) answered yes, and the rest answered maybe. Most people (70%) are willing to pay the same amount for a BVA product as they would for the same product but organic, and roughly 25% are even prepared to pay more. However, high costs can exclude low-income individuals, as is often the case with “sustainable” food (Hough & Contarini, 2023). Nevertheless, Geels (2019) mentions that a common challenge for niches is that there are uncertainties regarding the users and their

preferences. While these numbers only represent a small group of people, they give an indication of how potential consumers view BVA. This view can be described as mostly positive, meaning there is potentially a consumer base for BVA products in Sweden.

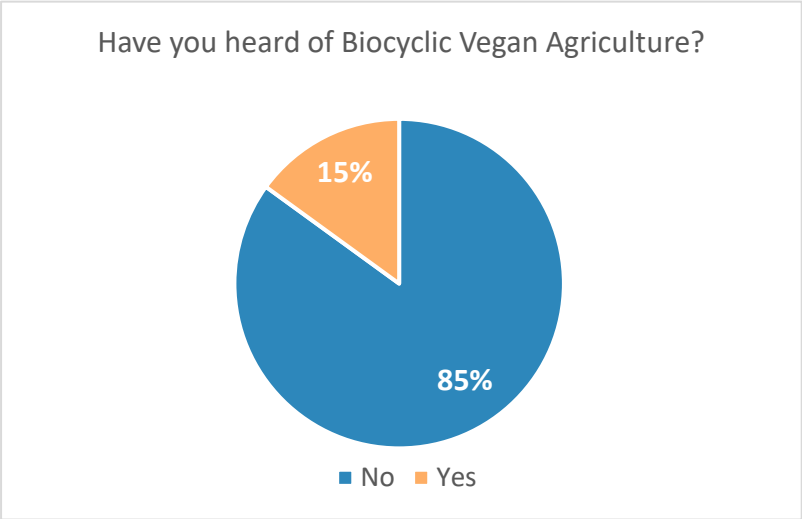

Figure 2. Percentage of respondents who had previously heard of BVA. Own illustration based on results from the online survey.

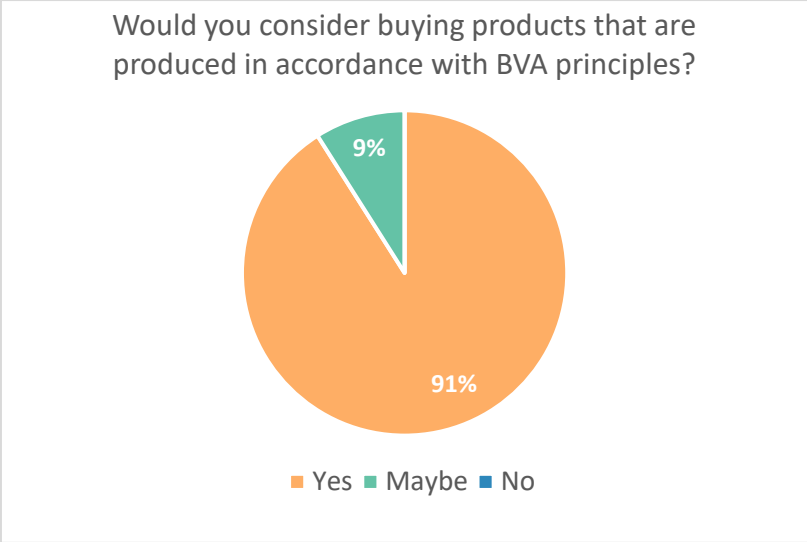

Figure 3. Percentage of respondents who would consider buying products produced in accordance with BVA principles, after having been given a short description of said principles. Own illustration based on results from the online survey.

Concerning *infrastructure*, two barriers were identified by the farmers and growers. One is what is already mentioned in section 5.1, regarding the certification process. There are not approved auditors in every country. This means that if a farmer in a country where there are no other certified BVA farms wants to get certified, they themselves have to find someone who will become an approved auditor. This can be time consuming, and the alternative is bringing an approved auditor from another country,

which can be costly. In the case of Sweden, the biocyclic farmer mentions that some agricultural certification actors have opposed the introduction of BVA certification. The farmer claims to have been in close collaboration with an actor willing to get the training to be able to audit BVA farms, but that the actor was contacted by another agricultural certification body in Sweden and was discouraged from continuing.

Furthermore, as revealed in the interview with the British biocyclic cereal farmer, there is a need for approved processing plants/mills. While their farming operations are BVA certified, the products are not allowed to display the BVA label, since they are not processed at an approved processing facility. While it is possible for processing facilities to become BVA approved, this can be costly, and the alternative, for the farmer to process themselves, can be more costly and time consuming. This barrier does not exist for horticulturists, as their products do not need to be processed before they are sold.

Regarding *regulations & policy*, some aspects were brought up during the interviews. Namely, the two Swedish farmers mention a difficulty in receiving agricultural subsidies due to their small size. The British farmer argues that horticulturists, which a majority of current BVA farmers are, are typically overlooked when it comes to subsidies. For deeper analysis, I turn to the analyzed policy documents on an EU and Swedish level. Within the overall framework of The European Green Deal, and The Common Agricultural Policy, there are many policies that will have an impact on future agriculture in the EU. Many of these policies are in line with the values of BVA.

The EU Biodiversity strategy for 2030 aims to reverse the decline of pollinators. This is to be achieved by reducing the use of chemical pesticides by 50%, and the use of more hazardous pesticides by 50% as well (European Commission, 2021a). It also aims to reduce the loss of nutrients from fertilizers by 50%, which will result in an at least 20% reduction in overall fertilize use. Furthermore, it aims to ensure that a minimum of 10% of agricultural land is under "high-biodiversity" landscape features. There is also a target of placing a minimum of 25% of agricultural land under organic farming practices, and to increase the number of agro-ecological practices (European Commission, 2021a). While the strategy does not mention any specific incentives for farmers to achieve this, the guiding principles may shift the narrative to one more akin to the BVA approach.

The Farm to Fork Strategy provides aims and targets on the many levels of food production. Similar to the biodiversity strategy, it mentions an urgent need to reduce dependence on pesticides, overuse of fertilizers, biodiversity loss, and instead increase and promote organic farming, through an organic action plan. It also introduces of *"eco-schemes*", which will offer funding to boost sustainable agricultural practices, such as "*precision agriculture, agro-ecology (including organic farming), carbon farming and agro-forestry."* (European Commission, 2019). Given high amounts of carbon in humus soil

(Biocyclic Vegan, 2022), this could be an opportunity for the BVA farmers to receive extra income for their practices, incentivising more to transition.

Additionally, the Farm to Fork strategy also mentions the dietary aspect. For instance, it states that "*the Commission is undertaking a review of the EU promotion programme for agricultural products, with a view to enhancing its contribution to sustainable production and consumption, and in line with the evolving diets*."(European Commission, 2019). The strategy emphasizes that moving to a plant-based diet, and replacing red and processed meat with fruits and vegetables will reduce both health risks and environmental impacts. Advertising red meats at low prices must therefore be avoided (European Commission, 2019). The strategy also aims to improve the availability of alternative proteins, including plant-based ones. Lastly, the strategy wants to ensure tailored solutions to enterprises in food processing, service, and retail to develop new skills relating to sustainable practices without any additional administrative costs (European Commission, 2019). This could prove to be an opportunity for BVA cereal producers to get their products labeled and on the market.

As per *The EU Soil Strategy*, the EU has an overarching target that by 2050, all EU soil ecosystems should be in healthy condition, requiring decisive changes in the coming decade (European Commission, 2021b). The EU provides a definition of what a healthy soil is, which agrees with the characteristics of BVA in many ways. "*Soils are healthy when they are in good chemical, biological and physical condition, and thus able to…: provide food and biomass production, including in agriculture and forestry; absorb, store and filter water and transform nutrients and substances…*" (European Commission, 2021b). The EU Commission will also work to enhance biodiversity in agricultural land, and increase soil organic carbon (European Commission, 2021b), both of which are staples of BVA. With the Soil Health Law they are assessing the legal requirement of sustainable soil use. They are also looking into, in collaboration with stakeholders and member states, preparing a set of "sustainable soil management (SSM)" practices, which includes regenerative farming with agroecological principles (European Commission, 2021b). Further, they want to create a network of SSM ambassadors and practitioners, which includes regenerative and organic agriculture. If the Biocyclical Vegan Network were one of the invited stakeholders and/or ambassadors, it could be an opportunity. Sustainability transitions can be hindered by a lack of shared visions (Geels, 2010). Since sustainability is a contested and ambiguous concept, with different actors having different interpretations and priorities of environmental problems, disagreements will arise over the appropriate policies (Geels, 2010). A situation like this provides an opportunity for the different stakeholders, including BVA farmers, agroecologists, organic farmers, and policy makers to find some common ground. This could be seen as a multistakeholder learning process, which Rotmans et al. (2001) and To et al. (2018) claim is an important aspect for sustainability transitions. Additionally, the increased cooperation between researchers and government officials can

lead to an enhanced outreach of an approach (Hauser & Lindtner, 2017). Niche-regime interactions can give an opportunity for niche-actors to create networks with or gain support from "sympathetic" regime actors (Diaz et al., 2013; Ingram, 2018) Still, Järnberg et al. (2018) argues that while this type of collaboration could potentially have a direct impact on a large scale, it also comes with a risk of trade-offs which could reduce the prospects of a full transition.

Furthermore, the EU is willing to assist member states in a program that will allow farmers to test their soil for free (European Commission, 2021b). The Swedish biocyclic farmer mentions not having tested their own soil due to costs. If the soil test would prove that the soil of a biocycilc vegan farm is as good as the claims by the Biocyclic Vegan Network, this could add legitimacy to the practice. It could also serve as an important information and learning tool for farmers. Lastly, The EU Soil Strategy puts a lot of emphasis on increasing soil literacy. This includes funding research solutions to increase soil biodiversity, and to "*Launch a soil literacy engagement and awareness initiative*" (European Commission, 2021b). Lack of soil awareness and literacy was mentioned by many biocyclic vegan farmers as an obstacle, both within the farming community and among consumers, and could thus be reduced with this initiative.

On a national level, I look at *Sweden´s CAP Strategic Plan*. There are policies that could provide an opportunity for BVA to grow. However, there are also policies in place which could act as barriers instead. Overall, the strategy "*aims to increase the productivity, viability and competitiveness of the agricultural sector while protecting animal welfare and seeking increased ambition in environmental and climate standards*" (European Commission, 2022). Another top priority lies in increasing food production. The strategic plan mentions giving additional support to the bovine sector, since those industries are currently undergoing difficulties with regards to declining production and number of animals (European Commission, 2022). Around 14 000 beef and dairy farmers will receive support for livestock production, to ensure profitability (European Commission, 2022).

Furthermore, around 30% of the financial contribution from the EU will go towards *"environmental and climate objectives, focusing on carbon sequestration, biodiversity and valuable grasslands, as well as increasing knowledge about sustainable production*" (European Commission, 2022). This means that farmers can receive support for managing pastures and meadows, in order to enhance their cultural environmental and natural values (European Commission, 2022). Again, this puts a lot of emphasis on the beef and dairy industries, even mentioning the cultural value of grassland, while not mentioning other sectors, such as horticulture as much. Carbon sequestration claims of the beef and dairy sector have been questioned (Nordborg, 2016), but the biodiversity claims hold more weight (Tälle et al., 2016). From a BVA point of view, carbon sequestration and biodiversity are both featured within the

practice, which can be seen as an opportunity. On increasing knowledge about sustainable production, the plan mentions raising awareness on the carbon and nitrogen cycles. However, the measures mentioned include more efficient manure application, and digital tools to apply the precise amount of nutrients to a crop (European Commission, 2022). This is not in line with the way BVA views fertilization and nutrients and makes no mention of healthy and biodiverse soils. Instead, it shows similarities to the techno-centric efficiency narrative found in the agro-food regime in England (Ingram, 2018). These subsidies favorable to animal agriculture risk becoming a lock-in mechanism for the regime (Geels, 2011), further hindering a potential transition.

Sweden also has a plan for increasing the amount of organic food production. Although not necessarily catered towards BVA, The Biocyclic Vegan Network prefers for certified farmers to also become certified with the organic certification of that nation. This means that policies in place to increase organic farming could facilitate BVA transitions. However, as organic farming relies on animal manure this means it could also be an obstacle. The same goes for all policies aiming to increase organic farmland. The Swedish organic action plan has an overarching goal that 30% of agricultural land should be farmed organically by 2030, (Koch et al., 2018) which would mean an increase of roughly 12% from 2021 levels (Swedish Board of Agriculture, 2022). The plan is broad and covers most parts of the agrifood system and market. A lot of focus is put on organic animal agriculture, and grain production. Horticulture is not seen as statistically significant, but it is still given some weight as it could play an important role in the transition of certain regions. Much of the plan covers increasing competency, interests and knowledge. Examples of prioritized research and development areas within production are given. Some of these are well in line with BVA, including: "*sustainable plant nutrient management*", "*developing farming methods to increase mulch content and carbon sequestration*", and "*measures that benefit natural enemies and counteract weeds and pests*" (Koch et al., 2018).

Long-term policy frameworks are important for green innovations to grow (Freeman, 1992). Most of these policies only stretch to 2030, with Sweden's strategic plan for the CAP only lasting until 2027. However, given the severity of the climate and environmental crises and the central role agriculture plays in those, one can assume that new plans will be put in place towards 2040, 2050 and so on. It is therefore important that future policies stay on the same course, or go even further, to be in line with the approach of BVA.

5.3 Landscape factors potentially impacting the growth and transition of BVA in Sweden

Due to the slow rates of change happening at the landscape level, it is difficult to assess the impact of these changes, such as demographic changes, climate change and biodiversity loss. Other changes can

happen more suddenly and have an instant impact. I argue the recent Covid-19 pandemic, as well as the Russian invasion of Ukraine fall into this category, having major economic impacts with inflation and increasing living costs. These economic impacts are already felt, but it is hard to gauge the extent of them as of now. Nevertheless, some aspects were brought up in the interviews regarding these impacts. Most growers/farmers argued they were not particularly impacted by these economic changes in regard to production, as many of them use material found nearby or grown on their land for fertilization. As chemical fertilizer prices soar (Baffes & Koh, 2023), this could lead to more farmers relying on alternative fertilizers in the future. The Swedish vegan farmer expresses a concern for having to raise prices, which could lead to fewer customers. The British farmer shares similar concerns, and argues that one of the first things people do to save money is to buy less organic produce, which they argue also occurred during the 2008 financial crisis. The survey conducted for this study included a question on whether or not the respondent was buying less organic produce due to the economic changes. Roughly 60% buy slightly or a lot less organic produce, and only a small percentage (10%) claim that they buy the same amount as before.

The effects of climate change are already being felt to some extent and will be felt more in the future. It is difficult to predict the exact effect climate change will have on the agricultural sector, and how its impact will differ from BVA farmers to organic or conventional farmers. One can look at previous events where the effects of climate change were felt and speculate regarding the predicted effects. One of the vegan growers brings up the summer of 2018 as an example, where animal agriculture in particular suffered. The summer of 2018 was one of the hottest in Sweden, with record droughts and fires (Wilcke et al., 2020). This had a negative impact on the agricultural sector, as yields declined, both organic and conventional (Swedish Board of Agriculture, 2022). Many animals in the livestock sector had to be put down (Brogaard & Germundsson, 2020), and the farms required a lot of water. When asked about the recent warm summers, the Belgian farmer says they were not as affected by the droughts as neighboring farms, due to the water retention qualities of the soil. When asked if they personally believe that their farming/growing operations are more resilient to climate change compared to other approaches, all interviewees responded that they did. Another summer like 2018 could potentially show the need for a different approach to farming, meaning the landscape puts pressure on the regime and thus provides a window of opportunity for BVA. Disruptive events and crises have previously led to the emergence of alternative technologies and products. Such was the case with the emergence of alternative beef production as a response to the 2003 mad cow disease outbreak in Canada (Davidson et al., 2016). However, a window of opportunity would only be useful if the niche, i.e., BVA has managed to gain enough internal momentum to push into the destabilized regime (Geels, 2011). If not, there is a chance of another niche with more momentum seizing the opportunity. There is also a risk of the

regime simply altering some parts of its system and restabilizing, making future transitions even harder (Geels, 2011).

Landscape analysis is generally biased towards destabilization and pressure on the regime (Geels, 2011), and most MLP literature implies that landscape factors have a positive effect on the niche and its transition. However, evidence suggests this is not always true (Li et al., 2013). It is therefore important that landscape factors which may have a negative impact on the niche, or a positive impact on the regime, be considered. For instance, lower global or national yields due to climate change could instead push for further technological intensification of agriculture, rather than a transition. A continued decrease in organic consumption due to costs could also derail the transition.

5.4 The sustainability potential of BVA

As a whole, MLP papers on sustainable agri-food transitions are more focused on transition dynamics rather than discussing the sustainability potential (El Bilali, 2019). This is not exclusive to MLP papers, as the normative aspects of sustainability are often underdeveloped in research on sustainability transitions (Truffer & Markard, 2017). By assuming that green innovations are intrinsically sustainable and positive, discussions on how much sustainability improvements they actually offer and whether it is enough to address the environmental problems fast enough are often lacking (Geels, 2019). El Bilali (2019) argues that the transitory impact depends on how well the niche solves the problems that led to its emergence. Therefore, I dedicate this section to discuss the sustainability aspect of BVA as an agronomic practice.

As mentioned, there is a lack of scientific literature on BVA, and what exists is primarily focused on yield results (Eisenbach et al., 2018, 2019). It is therefore difficult to state the sustainability claims of BVA with some sort of certainty. There are however some things that can be determined by logic of reasoning. BVA does not permit the use of pesticides, which are harmful to pollinators and biodiversity in general (Brittain et al., 2010). Neither does it permit chemical or animal-based fertilizers, which is a leading cause of eutrophication (Smith & Schindler, 2009). Cover, rotational and companion crops work to reduce soil erosion, and create healthy soils (De Baets et al., 2011; Venter et al., 2016). BVA emphasizes maintaining and creating wildlife habitats, which is important since habitat fragmentation from agriculture is one of the biggest drivers of biodiversity loss (Bayne & Hobson, 1998). As mentioned, all farmers/growers considered their approach to be more resilient and sustainable compared to conventional/organic/animal agriculture. A reduced water use, lower amounts of pests, and fewer fungal attacks, compared to before they had transitioned to BVA, were all brought up by different BVA farmers.

However, one important aspect to address if BVA is to scale up is land requirement. This is important mainly for two reasons. One has to do with BVA farms not using the entire area for food production and the other is related to the amount of land needed to be able to produce enough biocyclic humus soil. Regarding the first issue, even though a BVA farm may have a higher yield/ha than a conventional or organic one (Eisenbach et al., 2018, 2019), the total yield of the farm may be lower since not all land is used for cultivation. This could mean that the total area of agricultural land would have to increase in the case of a BVA transition, potentially infringing on natural land high in biodiversity. If this were the case however, it should be noted that although the amount of agricultural land would increase, the biodiversity values of that land would presumably be higher than current agricultural land. Regarding the second issue, it is true that BVA advocates for a closed loop system and encourages farmers to use as much organic material from their own land as possible. Still, farmers may still need to bring in external sources of organic material or dedicate more of their own land to growing green manures, leading to lower yields. Compared to conventional agriculture, this equals a higher land requirement, since chemical fertilizers are not produced on agricultural land. However, the comparison to organic, and animal agriculture, is of more interest.

As reported in the Poore & Nemecek (2018) study, livestock, in particular beef and dairy cows, has significantly higher land use than grains, vegetables and legumes. The same goes for poultry and egg chicken, although the difference is smaller. However, these industries provide both food and manure. The question therefore remains: in a hypothetical situation where BVA has transitioned to the regime at the expense of animal agriculture, is the “newly available” land (presumably land that previously produced fodder crops) enough to provide the same/more amount of food, and enough organic material to create biocyclic humus soil for the new BVA farms? This question is difficult to answer given the little data available on BVA and the overall complexity of agri-food systems, pointing towards a need for more research on the agronomics of BVA. Lastly, another potentially sustainable factor of BVA is the biocyclic humus soil. The (Eisenbach et al., 2019) study showed that the same quantity of humus soil that was applied for the tomato growing experiment could be used again for the following cultivation period. The humus also showed signs of a stabilized carbon structure, which is important for sequestering and retaining carbon. In other words, biocyclic humus soil could allow for less inputs when the soil has stabilized and keep high carbon levels.

6 Conclusions

With this thesis I set out to look deeper into how BVA could potentially become more widespread within Sweden, by posing the overarching question of what obstacles and opportunities exist for BVA to become an established practice within Swedish agriculture. I looked into developments on niche, regime and landscape levels, and came to the following conclusions. A lack of clearly defined and broadly accepted visions poses one of the barriers for BVA to solidify as a niche. Difficulties in recruiting new members and expanding the network acts as another barrier. The strict guidelines of the Biocyclic Vegan Standard can make it difficult for farmers to convert to BVA, but loosening the guidelines can dilute the values and principles of the niche. Allowing livestock farmers to transition can be an opportunity. On a regime level, one major obstacle was identified in the narratives surrounding veganism, as it led to some farmers and growers downplaying the vegan aspect of their operations. Important pieces of infrastructure are missing, namely auditing bodies and processing plants for grains, which hinder the development of the niche. The findings from the online survey suggested that there is a potential consumer base for BVA products should they be on the market, which is an opportunity. The policy review showcased a change in sustainable agricultural narratives on EU level, which mostly correlated to the principles of BVA. Aims for reduced pesticide and fertilizer use, increased biodiversity on agricultural land, increased agro-ecological practices, and better soil management are indicators of this. The introduction of "*eco-schemes*" could also prove an opportunity in the form of a financial incentive for BVA farmers to make use of. On a Swedish policy level, narratives were more in line with the current regime, and put more emphasis on animal husbandry, which could make transitioning harder. Changes on the landscape level can impact the transition trajectory in different ways and is hard to predict. Increasingly warmer and drier summers could lead to calls for a change in agricultural practices, or to the increased intensification to ensure high yields. Lastly, the sustainability potential was addressed. The lack of scientific evidence to back up the positive claims of BVA practices proves to be an obstacle when pushing for a transition. On paper, the practice includes many methods that are less environmentally harmful, but questions over land-use change should be raised and answered if BVA is to scale up. The amount of land needed to grow enough organic material to produce biocyclic humus soil is unknown and could be problematic if too high.

7 References

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Appendix I

Table of interview subjects + date and length of interview

Classification	Extent	Country	Total farm area	Production orientation	Date	Approximate length of interview
Vegan*	Farmer	Sweden	0.2ha	Horticulture	20/02/2023	55 minutes
Vegan*	Grower	Sweden	60sqm	Horticulture	22/02/2023	58 minutes
Vegan*	Grower	Sweden	150sqm + 0.13ha	Horticulture + Agroforestry	24/02/2023	57 minutes
Vegan*	Grower	Sweden	30sqm	Horticulture	24/02/2023	1 hour, 9 minutes
BVA**	Farmer***	Sweden	1.1ha	Horticulture	07/03/2023	1 hour, 38 minutes
BVA	Farmer	UK	134ha	Cereal	14/03/2023	1 hour, 2 minutes
BVA	Farmer	Belgium	7ha	Horticulture	07/04/2023	55 minutes

Table of exemplary interview questions. Note that the exact order and manner of questions differed between the interviews, in particular between certified biocyclic farmers and solely vegan farmers/growers.

Introduction/background questions	How long have you been growing food for?
	Do you sell (some) of your yields commercially?
	If so, through what channels/markets?
	Do you market/promote that you sell vegan/BVA crops?
	What do you grow?
	Is there anything that is harder/easier to grow vegan/BVA?
	How much land do you grow on?
	How would you describe your “growing method/philosophy”?
	How do you give nutrients to your crops?
	How do you give nutrients to your crops?
	How do you work to create fertile soils?
	How do you deal with pests and insects?
	Have you always grown Biocyclic/vegan food?
	Why do you grow Biocyclic/vegan food?

Niche related questions	How did you hear/learn about (B)VA?
	Do you ever talk to other farmers/growers about (B)VA?
	For BVA network leader: What is your vision for BVA?
	What types of changes would you need to see for this to grow?
	What knowledge is needed/missing to grow?
	How are you working with growing the network and spreading the practice?
Regime related questions	What are the biggest challenges to growing food in a (Biocyclic) Vegan way? • Practically? • Financially? • Regulation wise?
	Has anything made it easier to grow food with the (B)VA method compared to when you started?
	How do you get BVA certified?
	What is the biggest obstacle?
	Do you think more [certified products] would lead to an increase in demand from consumers?
	How do people react when you tell them about (B)VA? What is the general attitude?
	Are there any common arguments you'd hear against (B)VA?
Landscape related questions	In what ways are you influenced by the current inflation and increasing prices?
	What impact does climate change and issues surrounding biodiversity and the environment have on your farming?

Appendix II

Questions and responses from conducted online survey.

Question 1: How old are you?

	Under 18	18-29	30-45	46-60	Over 60
n	0	44	46	7	2
%	0	44.4%	46.5%	7.1%	2

Question 2: Where do you live?

	Stockholm	Malmö	Gothenburg	Lund	Other
n	18	17	13	11	40
%	18.2%	17.2%	13.1%	11.1%	40.4%

Question 3: Where du you buy your food products? (Select all that fit)

	Grocery store	Convenience store	Directly from farmer	Farm shop	Online	Other
n	98	15	8	7	6	6
%	99%	15.2	8.1	7.1%	6.1	6.1%

Question 4: Which of the following best describes your diet?

	Vegan	Vegetarian	Omnivore
n	90	8	1
%	90.9	8.1%	1%

Question 5: Is it important for you to buy produce and foodstuff with a lower ecological and carbon footprint?

	Very important	Pretty important	Indifferent	Not that important	Not important at all
n	38	51	6	3	1
%	38,4%	51.5%	6.1%	3%	1%

Question 6: Aside from it being vegan, what is important for you when you are buying food? (Select everything you try to consider)

	In season	Locally produced	Organic	Price	Neither	Other
n	72	65	63	16	5	5
%	72.7%	65.7%	63.6%	16.2%	5.1%	5.1%

Question 7: Aside from it being vegan, what is important for you when you are buying food? (Select what you try to consider the most)

	Organic	In season	Locally produced	Price	Neither	Other
n	33	28	24	7	4	4
%	33.3%	28.3%	24.2%	7.1%	4.1%	4.1%

Question 8: Have you reduced the amount of organic and/or locally produced food as a result of rising food prices and the cost of living?

	Yes, a lot	Yes, a little	No	I don't know
n	21	41	33	4
%	21.2%	41.4%	33.3&	4.1%

Question 9: Does it matter to you if the food you eat has been produced using inputs of animal origin (e.g. manure, bone and blood meal or other residues from the animal industry)?

	Yes, a lot	Yes, a little	No	I don't know
n	27	53	10	9
%	27.3%	53.5%	10.1%	9.1%

Question 10: Do you see a need for produce that follow organic principles but whose production does not use any animal inputs such as manure and other residues from the animal industry?

	Yes	No	I don't know
n	71	6	22
%	71.7%	6.1%	22.2%

Question 11: Have you heard of Biocyclic Vegan Agriculture?

	Yes	No
n	15	84
%	15.2%	84.8%

Question 11a: If yes, how?

Read an article about it some years ago
Vegan and interested in farming
Wrote my thesis about it
Have been interested in the topic of vegan farming before and read/listened a bit about it. The term biocyclic is new to me but I think I understand the principles behind it

The farmer in Vånga.
A friend who grows vegetables that way, but I am not familiar with how it works.
Social media, farming association
I know that it is something made up by anthroposophists and the eco-movement.
Via the association in Sweden. Attended a lecture.
I grow vegan and organic food myself
The account vegantradgard on instagram
Have read about it!
I grow my own food and am to some extent familiar with ecology. Trying to create cycles as far as possible.
I follow the research on this
Read about it

Context given for question 12: Biocyclic vegan agriculture is a farming method that follows certain principles. These include, among others:

- Ecological principles (i.e. no pesticides, artificial fertilizers or GMOs)
- No animal products (i.e. no products of animal origin, such as animal fertilizers, bone meal, blood meal, etc.)
- Rotational and companion planting (i.e. different crops are grown on the same site in rotation, and crops that benefit each other are grown together).

- Integration of semi-natural areas next to the farm (i.e. planting plants that benefit local biodiversity and are not harvested).

Question 12: Would you consider buying food products that are produced according to these principles?

	Yes	No	Maybe
n	90	0	9
%	90.9%	0%	9.1%

Question 13: How much would you be willing to pay for a product with a biocyclic vegan label (compared to the same product but organic)?

	More than organic	Same as organic	Less than organic	Don't know
n	24	69	2	4
%	24.2%	69.7%	2%	4%

Question 13: Do you grow food?

	Yes, a lot	Yes, some	No
n	6	42	51
%	6.1%	42.4%	51.5%

Question 13a: If yes, do you use animal manure or other products (e.g., soil) containing animal products for growing? *

	Yes	No	Don't know
n	15	44	5
%	23.4%	68.8%	7.8%

*Note that more people replied to this question than who answered "yes" for the previous question, making these results inconclusive.