Assessment of the Organic Herb Supply Chain in the Netherlands and the use of Organic Plant Reproductive Material

Author: **Jody Viljoen**

Wageningen University & Research

Supervised by: **Maaike Raaijmakers**

Bionext

March, 2020

Bionext

WAGENINGEN UNIVERSITY & RESEARCH

Content

Glossary

Biodatabase	The Biodatabase shows the offer of organic seeds and vegetative propagating material available to the Netherlands.
Derogation	An authorisation in organic production for the use of seed and vegetative propagating material not produced by the organic production method, where the producers are unable to obtain propagating material from the organic production method.
European Plant Variety Database/ Common Catalogues	The EU database of registered plant varieties offers a search tool for all the agricultural and vegetable plant varieties whose seed can be marketed throughout the European Union.
Grass seed mixtures	Mixtures including grass and herb seeds for farmer's grasslands, meant for forage.
Herb producers	Farmers and producers of all types of herbs; indoor and outdoor cultivation of herbs in pot, cut or dried.
Naktuinbouw	Naktuinbouw (the Netherlands Inspection Service for Horticulture) promotes and monitors the quality of products, processes and production chains in the horticultural sector. The main focus is on propagating material, of national and international origin. Naktuinbouw is an Autonomous Public Body regulated by the Dutch Ministry of Economic Affairs.
Non-organic PRM	When a derogation is granted, organic farmers may use conventional produced PRM. An additional requirement in the organic regulation is that this conventional PRM is 'untreated' meaning it has not undergone any chemical treatment after harvest.
Organic seed	Organic seed is produced by a certified organic grower, so it has not been exposed to any chemicals throughout the growth in the field, the harvesting of the seed, and processing.
OrganicXseeds	OrganicXseeds is the most commonly used organic seed database which regulates the organic seed supply for Ireland, Denmark, Germany, Switzerland, the UK, Belgium, Luxemburg and Sweden.
Pesticide residues	Pesticides that may remain on or in food after they are applied to food crops.
Plant Reproductive Material (PRM)	All starting material in farming; seeds and vegetative propagating material such as cuttings.
EU Regulations	Regulations are legal acts that apply automatically and uniformly to all EU countries as soon as they enter into force, without needing to be transposed into national law. They are binding in their entirety on all EU countries.

Summary

Introduction

This study provides an assessment of the organic herb sector of the Netherlands. The aim of this study was to identify the current use of organic Plant Reproductive Material (PRM) for organic herbs and identify gaps and opportunities to reach 100% organic PRM use. Herbs have different uses, four were defined in this study: culinary, forage, tea and medicinal. This study mainly focussed on the supply chain for culinary herbs.

Materials & Methods

Qualitative research was performed by means of in-depth interviews with stakeholders in the supply chain for both conventional and organic herbs.

European Regulation

Regulation (EU) 2018/848 which comes into force on January 2021, establishes the principles of organic production and lays down the rules. To provide information on the availability of organic PRM on the market, regulation states that European countries must set up a national database listing the supply. When the database shows that the organic PRM needed is not available, organic farmers can apply for a derogation to use non-organic PRM. According to the new regulation, derogations should be phased out and only organic PRM should be used by 1 January 2036.

Organic Herb Supply Chain in the Netherlands

The organic herb supply chain of the Netherlands was identified and elaborated on in Chapter 5. Some important findings were:

Organic PRM producers

- There are only a few players in the Netherlands producing organic PRM for herbs, which is supplied all over the world. The most important companies producing organic herb seeds are De Bolster, Vitalis, Bingenheimer Saatgut and Hild Samen GmbH. For cuttings there is one company; Biological Youngplants.
- As the profit margin on (organic) herb seed is low, (organic) breeding does not take place. Limited improvements are made to existing herb seeds.
- The offer on the Biodatabase differs from that on the websites of PRM producers, updating the offer on the Biodatabase is not a priority to them.
- As long as derogations are granted for the use of non-organic PRM, there is no economic benefit for PRM producers to invest in the production of organic PRM.

Organic herb seedlings

- Jongerius Houten is a large producer of organic herb seedlings in the Netherlands, they use organic seeds.
- Seedlings can be an advantage for organic herb production due to their dominance over weeds in the field, uniformity, no germination losses and shorter exposure to climatic conditions or pests and diseases.

Organic herb producers

- Vegobel and Especia are the two large producers of fresh organic herbs for the Dutch market. In general, organic PRM is used, however organic PRM is not available (in sufficient quantities) for Especia's complete production. This is an issue for mint and redvain dock in particular.
- The supply of organic fresh cut herbs is small, these are only available in organic supermarkets supplied by Fresh Organic Choice, Greenfresh and PuurNL. Production mostly takes place outside of the Netherlands and it is not known if organic PRM is used.
- The assortment of organic dried herbs in jars is small in conventional supermarkets, these are mainly from Verstegen, Bio+ or a private label of the supermarket. Insufficient information

was gathered to make conclusions about their PRM use. In organic supermarkets the largest assortment of organic dried herbs is from Het Blauwe Huis, who uses organic PRM.

Conventional herb producers

- Buysman Kruiden was the most important conventional producer identified for fresh herbs in pot in the Netherlands.
- Fresh cut herbs in the supermarkets are not organic and imported and produced all over the world.
- Reasons to produce conventional herbs instead of organic herbs are that the quality is claimed to be higher as well as the volume, nitrogen and calcium content.

Organograms of the stakeholders identified for the three supply chains - fresh in pot, fresh cut and dried herbs – can be found in Chapter 5.5.

Recommendations for Increased Use and Production of Organic PRM

In Chapter 6, the following recommendations were made to increase the production and use of organic PRM for organic herbs:

- PRM producers are recommended to take a look at the list of derogations published yearly and look into options to create an organic alternative. Producers of both conventional and organic PRM could look into their own sales of conventional PRM to organic farmers and discuss options to create an organic alternative. It is expected that opportunities for increased organic herb PRM lie in outdoor cultivation, grass seed mixtures and organic cut herbs.
- Strict regulation and supervision is necessary as not all producers want to use organic PRM out of principle.

The Biodatabase

In the Netherlands, the Biodatabase was established, listing the supply of organic PRM in the Netherlands. Crops fall under one of the three categories based on the availability of organic PRM. Crops on category 1 have sufficient organic PRM available, derogations are not possible. For crops on category 2, organic PRM is not sufficiently available and a derogation is possible under certain circumstances. For crops on category 3, no organic PRM is available and a general derogation applies. “Fresh” herbs are on category 1 – except for basil, lavas and parsley – and “industrial” herbs are on category 2.

Recommendations for the Biodatabase

The Biodatabase fulfils all legal requirements, however currently has many shortcomings and the following recommendations were made in Chapter 8:

- Listing all available organic PRM in the national database is the first step to limit the number of derogations, this is currently not the case. As Skal has a database with all PRM producers, they should create awareness about the existence and importance of the Biodatabase amongst organic PRM producers.
- The Biodatabase manager is recommended to send email alerts to PRM producers to remind them to update their offer. There should also be consequences when producers do not renew their information.
- The inclusion of a fourth category, with crops which will be added to the National Annex in the coming 2-3 years, should be discussed by the expert groups.
- The inclusion of a “category search” function, with all the herbs listed under the category “herbs”.
- Using consistent alternative names for types of herbs when there are no official variety names.

- Creating the three segments “fresh”, “dried” and “forage” for herbs, and listing suitable supply under each segment by providing PRM producers with the option to specify for which market their offer is. The list of derogations published must include these segments too.

Discussion

Due to time constraints, it was not possible to gather all information from stakeholders and identify the complete supply chain. For the information that was received from stakeholders, it was not possible to check whether the information provided was correct.

For future research, it would be interesting to look into why there are no organic fresh cut herbs in the conventional supermarkets.

For herbs on the Biodatabase, the main issue was that the differentiation made between different markets is not used. It is expected that with proper use of these segments, the derogations will decrease.

Dutch Summary

Introductie

In dit onderzoek wordt de Nederlandse biologische kruiden keten onderzocht met als doel het gebruik van biologisch uitgangsmateriaal in de productie van biologische kruiden te achterhalen. Knelpunten en mogelijkheden worden geïdentificeerd om 100% biologisch uitgangsmateriaal voor biologische kruiden te realiseren in de toekomst. Vier toepassingen van kruiden zijn in deze studie gedefinieerd: culinair, voedergewas, thee en medicinaal. Deze studie focuste voornamelijk op de keten van culinaire kruiden.

Methode

Kwalitatief onderzoek werd uitgevoerd door middel van semigestructureerde diepte interviews met betrokkenen in de keten van zowel gangbare als biologische kruiden.

Europese Wetgeving

Verordening 2018/848 van het Europees Parlement treedt in werking vanaf 2021 en betreft de regels omtrent biologische productie en de etikettering van biologische producten. Europese lidstaten moeten een nationale database bijhouden waarin het aanbod van biologisch uitgangsmateriaal vermeld staat. Wanneer er volgens de database geen aanbod beschikbaar is, kunnen boeren een ontheffing aanvragen om gangbaar uitgangsmateriaal te gebruiken. Volgens de nieuwe verordening moet er in 2036 genoeg biologisch uitgangsmateriaal zijn in heel Europa voor alle gewassen en wordt het systeem van ontheffingen afgeschaft.

De Biologische Kruiden Keten in Nederland

In hoofdstuk 5 wordt de biologische kruiden keten van Nederland geïdentificeerd en worden belangrijke bevindingen toegelicht.

Leveranciers van biologisch uitgangsmateriaal

- Er zijn maar een paar leveranciers die biologisch uitgangsmateriaal voor kruiden produceren in Nederland. De belangrijkste zijn De Bolster, Vitalis, Bingenheimer Saatgut en Hild Samen GmbH. Voor biologische stekjes is er maar één bedrijf; Biological Youngplants.
- Veredeling van (biologische) kruiden zaden vindt niet plaats omdat het niet rendabel is door de lage winstmarge.
- Het aanbod op de Biodatabase verschilt van dat op de website van de leveranciers, het aanbod op de Biodatabase bijhouden blijkt geen prioriteit te zijn.
- Zo lang er ontheffingen verleend worden om gangbaar uitgangsmateriaal te gebruiken, is er geen economisch belang voor de leveranciers om te investeren in meer biologisch uitgangsmateriaal.

Opkweek van biologische kruiden

- Jongerius Houten is het grootste opkweek bedrijf van biologische kruiden in Nederland, zij maken gebruik van biologische zaden.
- Vergeleken met het gebruik van zaden, hebben opgekweekte kruiden plantjes voordelen in de productie. Deze zijn; een voorsprong op onkruid, uniformiteit, geen verlies tijdens het ontkiemen en een verkorte blootstelling aan extreem weer, ziektes en plagen.

Biologische kruiden producenten

- Vegobel en Especia zijn de twee grote producenten van biologische verse kruiden op pot voor de Nederlandse markt. Over het algemeen wordt er biologisch uitgangsmateriaal gebruikt, echter is er niet (genoeg) biologisch uitgangsmateriaal voor de gehele productie van Especia, voornamelijk munt en bloedzuring zijn een probleem.
- Het aanbod van vers gesneden biologische kruiden is klein, deze zijn alleen beschikbaar in biologische speciaalzaken en worden geleverd door Fresh Organic Choice, Greenfresh en PuurNL. De productie vindt voornamelijk buiten Nederland plaats en het is onbekend welk uitgangsmateriaal wordt gebruikt.
- Het aanbod van biologische gedroogde kruiden in gangbare supermarkten is klein. Deze zijn voornamelijk van Verstegen, Bio+ of een huismerk van de supermarkt. Er is niet genoeg informatie verzameld om te concluderen of er biologisch uitgangsmateriaal wordt gebruikt in deze keten. In biologische speciaalzaken ligt er een groot aanbod aan biologische gedroogde kruiden van Het Blauwe Huis, zij gebruiken biologisch uitgangsmateriaal in de productie.

Gangbare kruiden producenten

- Buysman Kruiden zijn geïdentificeerd als de belangrijkste producent van gangbare verse kruiden op pot voor Nederland.
- Vers gesneden kruiden in gangbare supermarkten zijn niet biologisch verkrijgbaar en worden vanuit heel de wereld geïmporteerd.
- Belangrijke redenen om gangbare kruiden te telen, in plaats van biologisch, is dat het gewicht, de stikstof- en calcium gehalte hoger zijn.

In hoofdstuk 5.5 zijn organogrammen opgesteld van de spelers die zijn geïdentificeerd in de drie kruiden ketens in Nederland: vers op pot, vers gesneden en gedroogd.

Aanbevelingen voor een Toename in Gebruik en Productie van Biologisch Uitgangsmateriaal

In hoofdstuk 6 worden de volgende aanbevelingen gedaan om het gebruik en de productie van biologisch uitgangsmateriaal te vergroten.

- Leveranciers van biologisch uitgangsmateriaal worden aanbevolen om naar de jaarlijkse lijst van ontheffingen te kijken en mogelijkheden te onderzoeken om biologische alternatieven te ontwikkelen. Leveranciers van beide gangbaar en biologisch uitgangsmateriaal kunnen hun eigen verkoop van gangbaar uitgangsmateriaal aan biologische boeren en bedrijven bekijken en samen met de klant op zoek gaan naar biologische alternatieven. De verwachting is dat er mogelijkheden zijn voor de biologische kruidenteelt op vollegrond, in weidemengsels en voor vers gesneden kruiden.
- Strenge wetgeving, en toezicht daarop, is essentieel omdat niet alle biologische boeren en bedrijven principieel zijn in het gebruik van biologisch uitgangsmateriaal.

De Biodatabase

In Nederland werd de Biodatabase opgericht waar al het aanbod van biologisch uitgangsmateriaal in wordt vermeld. Op basis van de hoeveelheid biologisch uitgangsmateriaal beschikbaar, worden gewassen onder een van de drie categorieën geplaatst. Voor gewassen op categorie 1 is er voldoende uitgangsmateriaal beschikbaar en is het niet mogelijk om een ontheffing aan te vragen. Voor gewassen op categorie 2 is er niet altijd genoeg materiaal beschikbaar en mag er onder bepaalde omstandigheden een ontheffing aangevraagd worden. Voor gewassen op categorie 3 geldt er een

algemene ontheffing; er is niet genoeg biologisch materiaal beschikbaar en gangbaar materiaal mag gebruikt worden. “Verse” kruiden – behalve basilicum, maggiplant en peterselie – staan op categorie 1 en “industriële” kruiden staan op categorie 2.

Aanbevelingen voor de Biodatabase

In hoofdstuk 8 worden aanbevelingen gedaan voor de Biodatabase en voor een betere inrichting van het aanbod voor kruiden.

- De eerste stap in het verminderen van ontheffingen is een compleet aanbod van het beschikbare biologisch uitgangsmateriaal op de Nationale database. Op het moment is dit niet het geval voor de Biodatabase. Gezien Skal een compleet overzicht heeft van alle leveranciers van biologisch uitgangsmateriaal, zouden zij de verantwoordelijkheid moeten nemen om onder hen het bestaan en belang van de Biodatabase bekend te maken.
- De Biodatabase manager wordt aanbevolen om leveranciers van biologisch uitgangsmateriaal een herinnering te sturen om hun huidig aanbod op de Biodatabase te vernieuwen. Ook moeten er consequenties zijn wanneer het aanbod niet wordt vernieuwd door de leveranciers.
- De expertgroepen moeten de toevoeging van een vierde categorie overwegen met gewassen die in de komende 2-3 jaar aan de Nederlandse Annex (categorie 1) worden toegevoegd.
- Een zoekfunctie op “gewasgroep”, met een opsomming van alle kruiden onder de categorie “kruiden”.
- Een consistente invoer voor het aanbod van kruiden die geen officiële ras naam hebben.
- Het creëren van de drie segmenten “vers”, “gedroogd” en “voedergewas” voor kruiden, en het geschikte aanbod eronder vermelden. Leveranciers van uitgangsmateriaal zouden bij de registratie van hun aanbod aan moeten geven welke markt het betreft. Kruiden op de lijst van ontheffingen moeten ook vermelden welk segment het betreft.

Discussie

Vanwege tijdsdruk was het niet mogelijk om alle informatie van de betrokken spelers te verkrijgen en alle betrokkenen in de ketens te identificeren. Voor de informatie die is verkregen van spelers in de keten was het niet mogelijk om te controleren of het juist is.

In verder onderzoek zou het interessant zijn om er achter te komen waarom er geen biologische vers gesneden kruiden in de gangbare supermarkten zijn.

Het grootste probleem voor kruiden op de Biodatabase is momenteel dat er geen gebruik gemaakt wordt van de twee segmenten “vers” en “industrie”. Het wordt verwacht dat wanneer er correct gebruik wordt gemaakt van de indeling, de ontheffingen zullen verminderen.

1. Introduction

1.1 Organic Plant Reproductive Material

Seeds are the foundation of farming and therefore, organic production should start with organic seed (Raaijmakers & Schäfer, 2019). Seeds are a farmer's first defence against pests, diseases and other production challenges and dictate the quality and integrity of the crop (Hubbard & Zystro, 2016). Organic farmers produce differently from conventional farmers and that means they need different seeds; ones developed to thrive without synthetic fertilizers and pesticides, and adapted to their local climate and soil conditions. Farmers rely on the genetics contained in the seed to help defend their crops (Hubbard & Zystro, 2016). Besides seeds, other propagation material can be used such at cuttings, therefore the collective term Plant Reproductive Material (PRM) is used to indicate all starting material in farming.

Regulation (EU) 2018/848, which will become effective from the first of January 2021, establishes the principles of organic production and lays down the rules. Using organic PRM is an essential requirement of this regulation. To provide information on the availability of organic PRM on the market, European countries must set up a national database listing the supply of organic PRM. When available according to the national database, organic farmers are obliged to use organic PRM. However, there is a lack of organically produced PRM on the market (Solfanelli et al., 2019) so when the database shows that the organic PRM needed is not available, or not sufficiently, organic farmers can apply for a derogation to use non-organic PRM.

Given the strong Dutch seed sector, the first National Annex was established in the Netherlands in 2004 (Raaijmakers & Schäfer, 2019). A National Annex is a list of species and sub-species for which sufficient organic propagated seed or vegetative propagating material is available and (in principle) organic farmers are unable to receive derogations to use non-organic PRM. The Dutch National Annex is public and can be found at www.biodatabase.nl.

Increasing the availability and use of organic PRM across Europe is one of the priorities of the European organic movement. According to the new Organic Regulation 2018/848, derogations should be phased out and only organic PRM should be used by 1 January 2036.

1.2 Herbs

This study focussed on the production of organic herbs in the Netherlands. Fresh herbs (herbaceous plants) refer to leafy green parts of a plant that have a culinary use for flavoring, or in some cases a medicinal or non-food use (CBI, n.d.a). Four uses were defined in this study: culinary, forage, tea and medicinal herbs. Botanically, a distinction is made between annual-, biennial-, perennial plants and scrubs (CBI, n.d.a). Herbs are different from spices which are produced in warm climates from other parts of the plant, including seeds, bark, roots and fruit (Spicer, 2003).

Interest in cooking has increased over the years, consumers are becoming more aware of what they eat and appreciation for fresh, unprocessed products is increasing (Worsley et al., 2014). With this consumer trend of buying natural and appreciation of culinary experiences, the demand for herbs is increasing. Due to the increased attention to health and environment, there is also a growing interest in organically produced products. Pesticide residues are one of the crucial issues for fruit and vegetable suppliers as these products are consumed directly and therefore an organic label has value for fresh herbs (CBI, n.d.a). The European Union has set maximum residue levels (MRLs) for fresh herbs, but supermarkets in Northern Europe tend to be stricter in residue levels than the European regulation (CBI, n.d.a). In most supermarkets, fresh organic herbs have become the standard.

The most demanded fresh herbs in Europe are basil, chives, mint and parsley. Basil is the most popular culinary herb in Europe, making up between 60 and 75 percent of the total consumption. In individual countries, culinary tradition and the ethnic communities influence the type of herbs

consumed. In the Netherlands, mint is very popular and often used for fresh mint tea, the Indo-Asian influence raises the consumption of coriander and lemon grass. Whereas in Germany for example, chives are popular and the large Turkish community stimulates the sales of oregano and mint. (CBI, n.d.a)

1.3 Problem Statement

There are several issues within the organic herb supply chain in the Netherlands. Until now, incomplete, scattered information made it difficult to find solutions for increasing the use of organic PRM in the organic herb sector. Therefore, the following topics were identified in this study:

(1) First of all, there was no overview of which crops fall under the category 'herbs'. There was no clear definition for herbs or a demarcation of the different uses per herb (culinary, forage, tea, medicinal).

(2) Secondly, there was a lack of insight into the involved players in the herb supply chain. There was no overview of who produces organic PRM for herbs, who the producers are, the trade companies involved or where the products are sold and exported to.

(3) The complete cycle of an organic product should be organic which includes starting with organic PRM. Consumers of organic products assume that the product is completely organic, from the beginning of production, and do not realize that this is not always the case. The availability of organic PRM is scarce and therefore farmers are allowed to use conventional alternatives under specified circumstances. There was no overview of the current state of supply and demand of organic PRM for herbs, which made it difficult to identify where gaps are and opportunities lie.

(4) Lastly, the Dutch platform on which producers make the availability of organic PRM known, the Biodatabase, is outdated and incomplete. This database should provide interested buyers with up to date information on the availability of organic PRM and provide accurate information to Skal on which derogation decisions are based.

These problems have been addressed in this study with the flowing aim:

- To provide an overview of the organic herbs produced and sold in the Netherlands including their different uses.
- To visualize the supply chain of organic herbs in the Netherlands, identifying the connections between different stakeholders in the sector.
- To provide insight into the current use of (organic) PRM in the organic herb market of the Netherlands.
- To provide an analysis of the Biodatabase and its use among stakeholders in the organic herb sector in the Netherlands.

The ultimate goal of this study was to identify the use of (organic) PRM for organic herbs in the Netherlands and identify gaps and opportunities to reach 100% organic PRM use.

2. Materials and Methods

Qualitative research was performed by means of in-depth interviews with stakeholders in the supply chain for both conventional and organic herbs. Retailers were mostly visited and a few were interviewed. Interviews allowed an in-depth analysis of a relatively small sample size. Interviews took place between December 2019 and March 2020 in the Netherlands, but international players were also approached during the Bio-Beurs and BIOFACH. An interview guide was designed per player in the supply chain, and a semi-structured method was used whereby the list of questions was not followed strictly. Both open and close-ended questions were asked to get the required information. Information was also acquired over the phone or via e-mail when personal interviews were not possible. Many stakeholders were contacted for this study, information was exchanged with the following companies:

Seed companies	De Bolster, Vitalis/ Enza Zaden, HEM Zaden, Hazera Seeds, Bejo, Rijk Zwaan, Bingenheimer, ReinSaat, Cruydt Hoeck and Garden Seeds
Companies for cuttings	Biological Youngplants
Seedling companies	Jongerius Houten, West Plant Group and Plantise
Organic herb producers	Het Blauwe Huis, Kruidenhuis de Vlo, VNK Herbs, Vegobel, Gipmans/Especia and Herbier du Diois
Conventional herb producers	Buysman Kruiden
Outdoor cultivation	Bevelander tuinderij (conventional), Biotrio (organic)
Grass seed mixtures including organic herbs	Pure Graze, Neutkens and the Louis Bolk institute
Brands/ trade/ import companies	Bio+, Udea, Herbafrost, Fossa Eugenia, Vitacress Real, Herbafrost, Nautilus and BD-Totaal
Retailers	Albert Heijn, Jumbo, Lidl, Aldi, Hoogvliet, Spar, Deen, Intratuin, Odin and Ekoplaza
Other	Bionext, Naktuinbouw, Plantum and Skal

The information provided in this study is based on the information received from these stakeholders.

3. Background Information

3.1 Definition of Herbs

The definition of “herb” in the Oxford dictionary is the following:
“Any plant with leaves, seeds, or flowers used for flavouring, food, medicine, or perfume.”

In botany, “herb” is described as:
“Any seed-bearing plant which does not have a woody stem and dies down to the ground after flowering.”

3.2 Categories of Herbs

See Table 1 for the organic herbs used in the Netherlands according to the Biodatabase, divided in four different uses: culinary, forage, tea & medicinal. Herbs are also used in different states, they can be fresh (cut or in a pot), dried or frozen. This study mainly focusses on the supply chain for culinary herbs.

Table 1 Organic herbs used in the Netherlands according to the Biodatabase, divided in four different uses: culinary, forage, tea & medicinal

Culinary herbs	Forage herbs	Tea herbs	Medicinal herbs
Burnet	Burnet		
Caraway	Caraway		
Chicory	Chicory		
Coriander	Coriander		
Fennel	Fennel		
Garden cress	Garden cress		
Parsley	Pasley		
Ribworth plantain	Ribworth plantain		
Yarrow	Yarrow		
Hyssop		Hyssop	Hyssop
Peppermint		Peppermint	Peppermint
Rosemary		Rosemary	Rosemary
Sage		Sage	Sage
Thyme		Thyme	Thyme
Borage			Borage
Lavas			Lavas
Wild marjoram/ oregano			Wild marjoram/ oregano
Basil		Basil	
Lavender		Lavender	
Lemon balm		Lemon balm	
Lemon basil		Lemon basil	
Lemon thyme		Lemon thyme	
Lemon verbena		Lemon verbena	
Marjoram		Marjoram	
Mint		Mint	
Stevia		Stevia	
Aztec herb			
Bittercress			
Black caraway			
Chinese chives			
Chives			
Chop suey greens			
Common sorrel			
Curry plant			
Dill			
Dragon			
Field mint			
Garden chervil			
Garden orache			
Mexican dragon			
Olive herb			
Oregano thyme			
Parsley root			
Pineapple sage			
Satureja			
Satureja montana			
Small curry plant			
Spearmint			
Watercress			
Woodruff			

3.3 Conventional and Organic Production of Herbs

Compared to other sectors, it is notable that there is little information available about the herb sector. The following is known. Western Europe is a stable market for fresh herbs with a growing demand over the past years and relatively stable prices. In 2016, the main countries producing fresh herbs that were relevant for the European market, were Italy and Israel and Spain was also developing their market (Peperkamp & Schotel, 2016). Organic cultivation takes up a significant percentage of the total herb production. France and Switzerland are important countries for organic production, and Bulgaria is also a leading producer (Boshnakova, 2018). Organic herbs are also a key crop in Montenegro and Croatia. In the Netherlands, a significant amount of fresh herbs are produced in protected horticulture (Peperkamp & Schotel, 2016). Organic production must take place in living soil – seedlings and herbs in pots to be sold together with the pot to the final consumer are the only exception to the rule. The EU regulation on organic farming contains no rules for greenhouse cropping, apart from a ban on hydroponic production (EGTOP, 2013).

Furthermore, the wild production of herbs is of notable size in Eastern Europe. In Bulgaria for example, there is a large collection of wild herbs of which most can be certified organic (Boshnakova, 2018).

Outdoor Cultivation

Outdoor cultivation is tailored to different climates, locations and soil conditions per herb, see Table 2 for the most used herbs. The total production of organic and conventional herbs is small in terms of growing area in the Netherlands, outdoor cultivation is only possible in the warmer summer months.

Table 2 Popular culinary herbs including soil circumstances and sowing & harvesting information. Information derived from huis-en-tuin.infonu.nl under 'kruidenteelt'

Herb	*Circumstances*	*Sow*	*Harvest*
Basil	Dry, light, well-drained soil, sunny but sheltered spot	Early summer	Once the leaves start to curl
Chervil	Grows on all types of soil except for a heavy clay or waterlogged ground	Spring and summer	After 6-8 weeks
Chives	Grow best on warm soil rich in hummus in the shade	Spring	After about 5 weeks
Coriander	Rich, well-drained soil, in the sun	Late spring	When the seed goes brown
Dill	Well-drained soil, in the sun	Spring	When the plant is 20 cm
Dragon	Drainage is essential, nutrient poor soil	After the last severe frost	Harvest leaves throughout the growing period, cut off to the ground three times
Mint	Moist soil, in the sun	Spring	As soon as it comes up
Oregano	Warm, dry spot on a calcium rich, stony ground	Early spring	Late summer
Parsley	Humus and nutrient-rich soil	Spring	When the plant is 20 cm
Rosemary	Light, sandy, dry soil, sheltered and needs a lot of calcium	Spring	Harvest small amounts from the second year
Sage	Well drained, calcium rich ground	Late spring	Early autumn, for oil rich leaves harvest the second year
Summer Savory	Nutrient rich, moist ground	Late spring	Twice: summer and autumn
Thyme	Light, well-drained soil with a lot of calcium, sunny spot	Late spring	Once the first year, twice the following years

Greenhouse Production

In the Netherlands, sensitive crops are grown in greenhouses, herbs also need a lot of light to develop their typical smell and flavor. In the dark, cold months herbs need artificial light in the greenhouses but and are also imported from other countries (Peperkamp & Schotel, 2016).

Herbs can be grown from seed in pots of 9-13 cm, the grower can sow seeds directly into the pot, or use seed discs, and let them germinate in the dark before they are moved to the greenhouse. Some growers choose to purchase seedlings or cuttings and place these in the pots.

Import and Export

The UK and Germany are significant importers of fresh herbs in the EU, mainly for their domestic markets (Peperkamp & Schotel, 2016). Furthermore, the Netherlands is an important trade hub for fresh products.

The European import of fresh herbs from non-EU countries increases during the winter. Kenya, Israel and Ethiopia are important suppliers from November to May (Peperkamp & Schotel, 2016). Furthermore, Morocco, Egypt and Turkey are suppliers of fresh herbs to Europe. The regulation about the use of organic PRM is organized European wide, there is no insight into the use of organic PRM from countries outside of Europe.

4. European Regulation on Organic Farming

European Union regulations on organic farming are designed to provide a clear structure for the production of organic goods across the whole of the EU. All products labelled as organic and sold in the EU must be produced in accordance with these regulations.

Regulation (EU) 2018/848 - adopted by the European Union in May 2018 - establishes the principles of organic production and lays down the rules concerning organic production, related certification and the use of indications referring to organic production in labelling and advertising. The Implementing Regulation has not been finalized yet and will be announced towards the end of 2020. The new regulation will become effective from January 1, 2021 and replace regulation EC No 834/2007 and Implementing Regulation EC No 889/2008 (Raaijmakers & Schäfer, 2019).

Using organic seed is an essential requirement of this Regulation and important for a fully organic cycle. To provide information on the availability of organic PRM on the market, European countries must set up a national database listing the supply of organic PRM. These databases are an important tool to facilitate the use and distribution of organic PRM by creating transparency and connecting demand and supply (Kurrig et al., 2018). All member states have a database for organic PRM but these are not all interactive, some are merely a static PDF file (Raaijmakers & Schäfer, 2019).

There is a lack of organically produced PRM on the market, both in terms of overall quantity and range of varieties available (Solfanelli et al., 2019). When available according to the national database, organic farmers are obliged to use organic PRM. However, when the database shows that the variety needed is not available, organic farmers can apply for a derogation to use non-organic PRM. Therefore, these databases are also an important tool for organic certifiers to grant derogations for the use of non-organic PRM (Kurrig et al., 2018).

Increasing the availability and use of organic PRM across Europe is one of the priorities of the European organic movement. According to the new Organic Regulation 2018/848, derogations should be phased out and only organic PRM should be used by 1 January 2036.

5. Organic Herb Supply Chain of the Netherlands

5.1 PRM Producers

Appendix 1 is a list of the organic PRM available for herbs, listed on the Biodatabase. A list of derogations granted in 2018 and 2019 is included too. An overview of the current offer of organic PRM for herbs per company was also comprised, see Appendix 2.

Most professional seed companies develop new varieties under conventional management (Ende, 2019). Successful conventional varieties are tested for performance under organic management - when successful, organic seeds are produced. Therefore, there is an advantage for non-organic seed companies to produce both conventional and organic seeds. More and more conventional seed companies are starting to explore organic possibilities. Even large companies such as Syngenta and BASF are considering such options which could greatly increase the total availability of organic seeds.

There are four seed companies that are named most in relation to the organic herb sector: De Bolster and Vitalis (subsidiary of ENZA) from the Netherlands and Hild Samen GmbH and Bingenheimer Saatgut from Germany. These companies all have their supply listed on the Biodatabase. Some claimed to produce organic seeds for the fresh as well as the industrial market, however their offer is currently only listed under the fresh market. Other Dutch seed companies with an assortment of organic herb seeds are HEM Zaden, Hazera Seeds and Bejo Zaden – of which HEM Zaden is not on the Biodatabase. The multiplication of organic seed, as well as the choice in variety, depends on demand from customers. In principle, it is possible to produce organic PRM for all herbs. Seed companies have customers all over the world who they are in close contact with. The United States is a large buyer, as well as North Western European countries like Germany. Sometimes clients want a specific variety but usually they require specific properties such as uniformity, high dry matter content or durability depending on their end product. In general, breeding does not take place for herb seeds as the profit margin is too low and investments are not profitable, but improvements are made. Besides loose seeds, organic seed discs can be bought which fit perfectly in a pot (Figure 1).

Figure 1 Seed discs for fresh herbs in pot

There is also a company in the Netherlands selling organic vegetative propagation material for herbs from cuttings; Biological Youngplants. Cuttings are used in herb production to deliver a more robust plant or one with a stronger flavor. Biological Youngplants grows mother plants from which they cut tips off to plant so that they form roots (Figure 2). The organic herb cuttings are sold throughout Europe, the Netherlands is not a large buyer. Most of the cuttings are used to produce fresh herbs in pot. In the Netherlands, cuttings are mostly bought for mint, thyme, lemon thyme and lemon verbena. The advantage of propagation from cuttings is that the plant is stronger and has a longer shelf life. For example, mint produced from cuttings has a much stronger flavour and is used in fresh mint tea, fresh mint leaves from seeds are not suitable.

The organic supply of the PRM companies listed on the Biodatabase differs from that on their own website. De Bolster has a larger supply on their website which could be due to their sales to consumers in small quantities, which is not sufficient to be listed on the Biodatabase. Hild Samen also has a larger offer on the website. Bingenheimer Saatgut has some herbs on the website that are not listed on the Biodatabase and vice versa. Biological Youngplants only has a few herbs listed on their website and much more on the Biodatabase but this is due to their busy schedule and employee capacity. Furthermore, PRM companies claimed to not be approached by customers via the Biodatabase and therefore updating their offer is not a priority.

Figure 2 Planted mint cuttings, Biological Youngplants

There are not many herbs on Annex 1 in Europe, which prevents seed companies from investing into the production of organic herb seeds. Regulation is on a European level and PRM producers supply EU wide, it is a problem that the implementation of the law differs throughout the Member States.

The production of organic seed is more complicated, expensive and risky than conventional production. Seed companies stated that when it is not compulsory to use organic seeds, growers sometimes prefer to use non-organic seeds. Apparently, a higher price for organic seeds plays a role in the herb sector. As long as there is no regulation obliging buyers to use organic seeds, there is no economic benefit for seed companies to multiply organic seeds, let alone develop new organic varieties.

Important findings for organic PRM producers

- There are only a few players in the Netherlands producing organic herb seeds and propagation material, these are supplied all over the world.
- The offer on the Biodatabase differs from that on the websites of PRM producers, updating their supply on the Biodatabase is not a priority.
- As the profit margin on (organic) herb seed is low, breeding does not take place – although limited improvements are made.
- As long as derogations are easily granted for the use of non-organic PRM, there is no economic benefit for PRM producers to invest in the production of organic PRM.

5.2 Herb Seedlings

There are two important companies which produce organic herb seedlings; Jongerius Houten and West Plant Group (WPG). They produce seedlings such as those seen in Figure 3. Production is based on orders placed, there is no seedling stock. Seedlings are more expensive than seeds, but there are many advantages. Growing herbs is labor intensive due to high weed growth and therefore seedlings have an advantage over weeds in the field (compared to seeds). There is a higher uniformity, there are no germination losses and there is a reduced risk due to shorter exposure in harsh climatic conditions or pests and diseases[1].

Figure 3 Parsley seedlings, Nollet BVBA

Jongerius has the largest assortment and gets their organic seeds from the four main seed companies mentioned. Jongerius supplies their seedlings to small, medium and large producers, mainly in the Netherlands.

WPG has a much smaller presence in the herb market. They produce organic chives for a particular client with seeds from Enza and Hild Samen, valerian for VNK Herbs from VNK's own harvested seeds and organic oregano and sage for the Belgian market.

Important findings for organic herb seedlings

- There are two players in the Dutch market for organic herb seedlings, of which Jongerius is the largest.
- Seedlings can be an advantage for organic herb production due to their advantage over weeds in the field, uniformity, no germination losses and shorter exposure to climatic conditions or pests and diseases. Also, a more robust plant with a stronger flavor.

5.3 Herb Producers

Organic Herb Producers

Organic fresh herbs in pot

The largest horticultural producer of organic fresh herbs in pot for the Dutch market is Vegobel in Belgium. Vegobel multiplies most of their seeds themselves. They sell organic fresh herbs in pot to (organic) supermarkets in the Netherlands and Belgium. The other large horticultural producer of organic fresh herbs in pot is Especia (subsidiary of Gipmans), who sells their herbs to Dutch supermarkets via Fossa Eugenia. They mostly use organic PRM, but these are not always available (in large enough quantities), which is often the case for mint and redvein dock (bloedzuring).

Based on this information, this study concludes that organic PRM is mostly used for the production of organic fresh herbs in pot. Organic PRM is purchased from companies all over Europe. There are still a few herbs for which organic PRM is not available, and derogations need to be granted to use non-organic PRM.

Organic fresh cut herbs

Organic fresh cut herbs are grown all over the world and supplied to the Netherlands by Fresh Organic Choice, Greenfresh and PuurNL. In conventional supermarkets these are not available, organic fresh cut herbs are only available in the organic supermarkets. The large producer Vegobel does not supply fresh cut herbs as there is too much competition from Morocco and other countries in Africa. This

[1] https://hishtilsa.co.za/advantages-of-planting-seedlings/

chain has not been researched in depth as the organic segment is small and cut herbs are mostly imported from other countries. Therefore, it is not known if organic PRM is used.

It can be said that there is a gap in the market for organic fresh cut herbs, however more research needs to be done about why this segment has mostly conventional products. It could be that the outdoor cultivation of organic herbs is too expensive due to a high pressure of insects and high costs of organic fertilizer. In the Netherlands, fresh cut herbs are also grown on water, a hydroponic production process which cannot be certified organic.

Organic dried herbs

Companies selling organic imported dried herbs such as Spice Village, Kräuter Mix GmbH, ECOLAND Herbs & Spices GmbH or Boniser S.R.L. claimed that their farmers use farm saved seed. In the Netherlands, there is a small assortment of organic dried herbs on the market which are mostly imported from all over the world. Verstegen has a large assortment of organic herbs, however not everything is offered to consumers in the supermarkets. The producer of dried parsley for Verstegen in the Netherlands does not use organic seed; the specific variety needed, with a high dry matter content, is not available organically.

Organic dried herbs in the organic supermarkets are mainly supplied by Het Blauwe Huis, who imports most of their crops from their partner company Herbier du Diois in France. Both companies claim to produce their organic herbs from organic PRM. Their dried organic herbs are also supplied to restaurants, cheese makers, bakeries etc. Het Blauwe Huis is also a large supplier of dried loose organic tea for organic supermarkets, the other large suppliers of loose organic tea are Piramide, Simon Levelt and Dutch Harvest. However, these tea producers were not further researched in this study and therefore the use of organic PRM is not known.

Organic herbs for the industrial market

The share of processed, industrial organic products including organic herbs is small. Supermarkets have organic soup, sauces or broth for example from their private label and from Unilever brands such as Unox and Knorr. The organic herbs in Albert Heijn's industrial products are produced all over the world. The industrial company Herbafrost, a Belgian company in frozen organic herbs, gets some of its herbs from organic outdoor cultivation in the Netherlands. Herbafrost supplies their own organic seeds to the farmers, acquired from seed companies throughout Europe. Their organic frozen herbs are supplied to Nestlé and companies producing pizza's for example.

Not all companies wanted to share information about the origin of their herbs, and therefore it is not possible to make any statements about the seed use. It is expected that the price of seeds is an important factor for this sector. Seed companies stated that sales to consumers and small scale producers are highly profitable, there is nearly no margin on sales to industrial companies.

Important findings for organic herb producers

- There are two large producers of fresh organic herbs in pot for the Netherlands, in general organic PRM is used, however organic PRM is not available (in sufficient quantities) for all herbs.
- The production of organic fresh cut herbs is small and these are not available in conventional supermarkets. Production mostly takes place outside of the Netherlands.
- The assortment of organic dried herbs is small in conventional supermarkets and the use of (organic) PRM is unknown. In organic supermarkets, dried herbs are mostly from one producer and organic PRM is used.

Conventional Herb Producers

Conventional fresh herbs in pot

Not all fresh herbs on the Dutch market are produced organically. Buysman Kruiden is a conventional Dutch producer who has performed organic production trials due to demand from the customer. However, they found that they were not able to produce a good enough quality product. They were satisfied with the quality of the organic herbs in the summer, but in the winter nitrogen was limiting. Leaf measurements also showed that calcium content was lagging behind that of the conventional herbs.

In 2005, Especia said that they did not use crop protection agents but did not want to sell the herbs with an organic logo. Organically grown propagation material varied in quality and the suppliers could not guarantee stability of components. Additionally, they preferred fertilizer use for food safety and to control the growth of the herbs[2]. However, they currently only have organic fresh herbs and do not produce conventional herbs anymore.

Conventional cut herbs

Supermarkets sell conventional fresh cut herbs which are imported from all over the world by several companies. Fossa Eugenia for example, supplies conventional fresh cut herbs to supermarkets imported from all over the world by Vitacress Real. They said that they are not involved in the seed choice of the herbs, this is up to the farmers. Seed use in the conventional sector is not an issue as there is no shortage and there are no strict guidelines as for organic production. Outdoor cultivation of fresh herbs in the Netherlands is only possible in the warmer summer months, so it could be due to the climate that import is needed. It could also be that the Dutch market cannot compete with the prices of other EU or non-EU countries.

Other conventional herbs

There is a large range of conventional dried herbs in jars in the Dutch supermarkets. There is also a large range of industrial products including conventional herbs. These supply chains were not analysed as they are not relevant to this study.

Important findings for conventional herb producers

- Buysman Kruiden is the only conventional producer of fresh herbs in pot in the Netherlands.
- Reasons to not produce organic herbs are that the plants are of lower quality and have a low nitrogen & calcium content.
- Conventional fresh cut herbs supplied in the conventional supermarkets are produced all over the world.

5.4 Retailers

Figure 4 shows the share of the different conventional supermarket chains in the Netherlands. Albert Heijn (AH) is the largest and also includes its formulas AH XL and AH To Go. Jumbo also includes the few Jumbo Foodmarkt and Jumbo City establishments. Superunie is made up of a whole lot of supermarkets: CIV Superunie, Boni, MCD, MCD Alledag, Boon's Markt, Agrimarkt, Coop, CoopCompact, CoopVandaag, Deen, Dirk, Dekamarkt, Hoogvliet, Jan Linders, Nettorama, Plus, Poiesz, Spar, Spar buurt, Spar City Store, Spar Express, Spar University & Vomar.

According to the industry's annual trend report of 2018, the total annual turnover of organic products had risen to €843 million[3]. The market share of organic products in the supermarket fluctuates slightly above 3%.

[2] https://www.gfactueel.nl/Home/Achtergrond/2005/10/Kruidenteelt-is-goed-bewaard-geheim-GFA121333W/
[3] https://www.trouw.nl/economie/is-de-bio-super-nog-nodig-als-de-gewone-super-het-bio-succes-overneemt~b2e65bad/?referer=https%3A%2F%2Fwww.google.com%2F

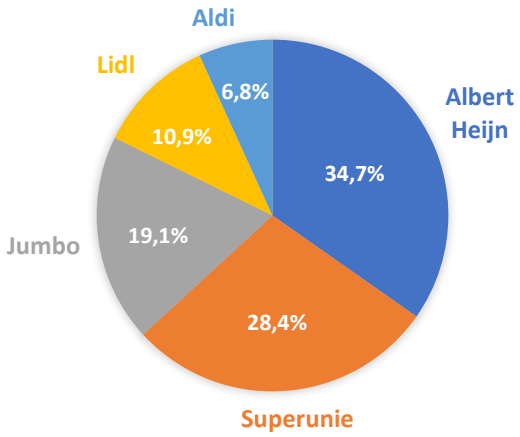

Figure 4 Supermarket share NL, 2018. Published by Nielsen & IRI.

Organic supermarkets have been under pressure since conventional supermarkets started expanding their organic assortment in 2014. There are about 250 organic supermarkets of which most are either an Ekoplaza (Udea chain) or Odin (Estafette chain) supermarket, with Ekoplaza being the largest. The difference between the cheapest conventional provider (Dirk) and the most expensive organic supermarket (Odin), went up to a 36% difference in a price survey. Odin claims that this price difference is due to the local origin of their products, compared to the supermarkets who import their products produced cheaper from all over the world.

5.5 Organogram of the Supply Chains for Herbs in the Netherlands

Organograms were made for the three supply chains: fresh in pot, fresh cut and dried herbs. This division was made as there are different stakeholders involved in each segment. Only the stakeholders relevant to the specific segment are included in the organogram. These organograms only include the collaborators identified in this short study, therefore the chains are not complete. Furthermore, the stakeholders and lines in green represent organic production and those in orange represent conventional production.

Fresh Herbs in Pot

As can be seen in Figure 5, Vegobel in Belgium was found to be the largest producer of fresh organic herbs in pot, with its products found at organic and conventional supermarkets, a garden center and wholesalers. These organic herbs are all produced from organic PRM, some suppliers were identified in this study, but most PRM is multiplied by Vegobel themselves. A few years ago, Vegobel also had a contract with Bio+ and thereby almost controlled the whole Dutch market. Most supermarkets affiliated with Superunie sell fresh organic herbs under the brand Bio+, at the moment they have a contract with Fossa Eugenia. Fossa Eugenia sells organic herbs from Especia, a subsidiary of Gipmans. Especia mostly uses organic PRM, however this is not always available. Both suppliers use organic seeds as well as organic cuttings.

Deen and Dekamarkt do not have organic herbs under the Bio+ brand (even though they are affiliated with Superunie) but conventional herbs from Buysman Kruiden. These are the last few stores in the Netherlands to sell conventional fresh herbs in pot.

Another selling point for organic fresh herbs in pot is at the garden center Intratuin. They also have an assortment of more durable, stronger plants which can be planted in the garden. These herbs are produced in the Netherlands and Italy and seedlings are used as starting material.

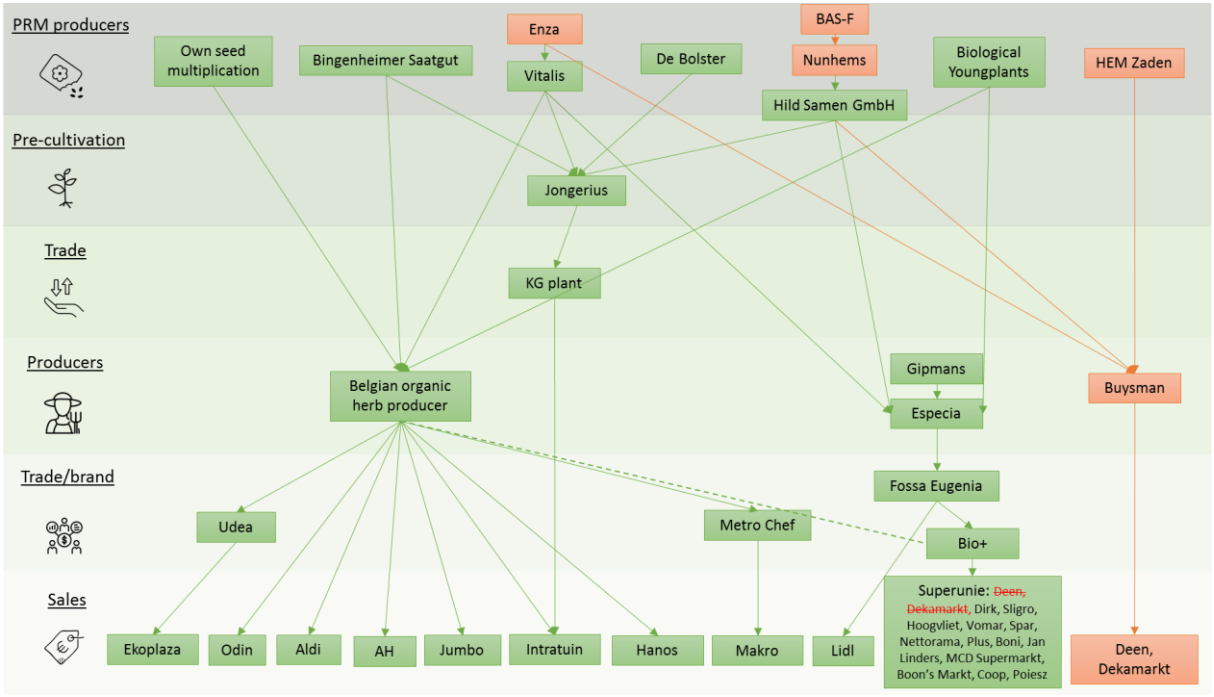

Figure 5 Organogram of the Dutch supply chain for fresh herbs (green is organic production)

Fresh Cut Herbs

For fresh cut herbs there are multiple players who import their products from growers all over the world (Figure 6). The organic supermarkets are the only ones with organic fresh cut herbs supplied by Greenfresh, PuurNL and Fresh Organic Choice. The conventional supermarkets sell conventional fresh cut herbs. The largest conventional supermarkets Albert Heijn and Jumbo sell fresh cut herbs under their private label. A few other supermarkets were visited and found to supply fresh cut herbs from Fossa Eugenia, Van Vugt or Smeding groenten en fruit. It is notable that these products are not produced in the Netherlands, although the production from the Netherlands might be higher in the summer. However, research into this supply chain was not continued as the herbs are not organic or currently not produced in the Netherlands. Therefore, it is unknown which PRM is used in this segment.

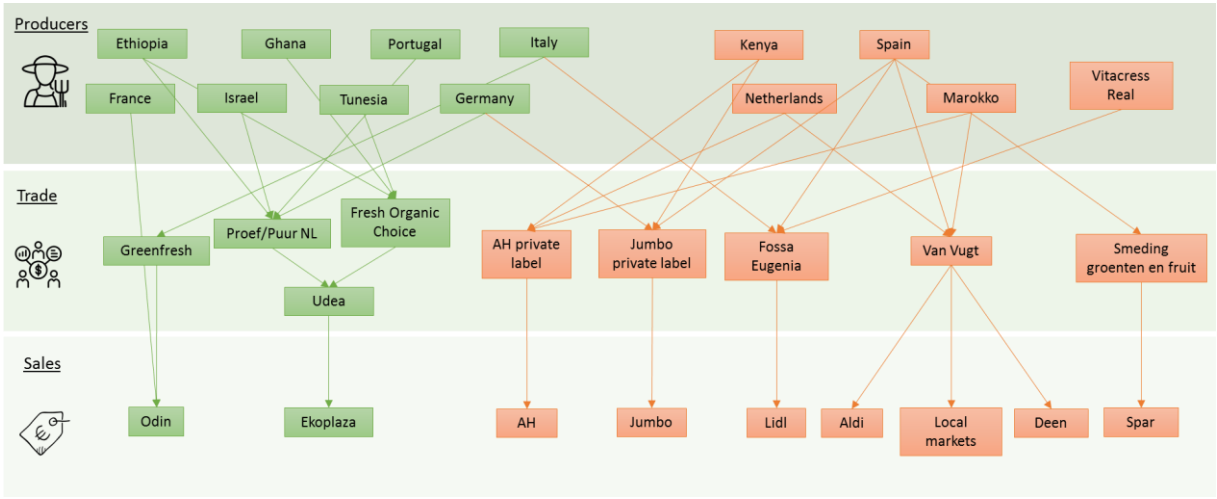

Figure 6 Organogram of the Dutch supply chain for fresh cut herbs (green is organic production)

Dried Herbs

Supermarkets include a small section of organic dried herbs in jars in their assortment. The conventional section is much larger and it must be clear that this organogram (Figure 7) is only of the organic assortment. Most organic herbs in conventional supermarkets are from Verstegen and there is an organic herb mix from A. Vogel. The supermarkets AH and Jumbo also have a small organic section under their own private label. The organic supermarkets have organic dried herbs from Het Blauwe Huis, the Organic Flavour Company and the French company Cook. Het Blauwe Huis uses organic PRM, however VNK for example, a producer for Verstegen, uses non-organic seeds due to the unavailability of organic varieties with a high dry matter content.

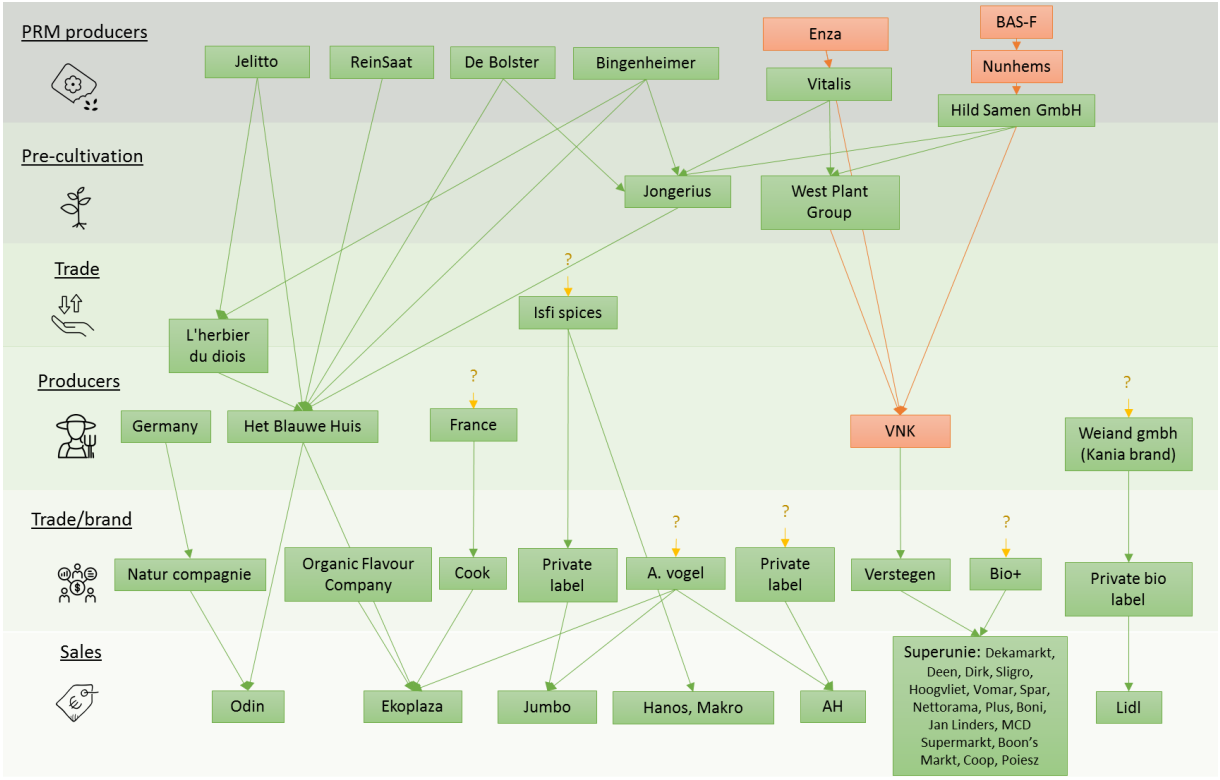

Figure 7 Organogram of the Dutch supply chain for dried herbs in jars (green is organic production)

6. Recommendations to Increase the Production and Use of Organic PRM for Herbs

In general, there is currently a lack of organic seed in all Member States of the European Union (Fuss et al., 2018), therefore it was assumed that this is also the case for herbs. In this study, producers of organic herbs claimed that organic PRM is not always available for certain varieties or in sufficient amounts. They said that if it was available, they would be obliged to use it. So, the demand side of organic PRM claimed that the problem lies with the PRM producers. However, the PRM producers claimed that there is not enough demand for organic PRM. Developing more organic PRM is not profitable for them as herbs are not on the National Annex in most EU countries. In the Netherlands, most herbs for the fresh market are on the National Annex, except for basil, lavas and parsley. However, many derogations are still granted for different herbs in the Netherlands.

Investigate herb (varieties) for which derogations are granted

A recommendation for the PRM producers is to look into the list of derogations granted, published yearly on https://biodatabase.nl/en/pages/index/13. When a large amount of non-organic PRM of a certain variety is used for organic production, PRM producers could look into options to create an organic alternative. PRM producers should start with the largest crops first.

Producers of both conventional and organic PRM could look into the sales of conventional PRM to organic farmers and discuss options to create an organic alternative. The advantage to this is that PRM producers have a guaranteed market for their product.

It is expected that opportunities for organic PRM production lie in the outdoor cultivation of organic herbs and with organic seeds for grass seed mixtures. Furthermore, it was found that the share of organic cut herbs was small, there might be an opportunity for PRM producers to develop suitable varieties and expand this organic market.

Strict regulation

An important means of increasing the use of organic PRM, is regulation. Strict regulation is necessary as not all organic herb producers want to use organic PRM out of principle. Some producers try to make use of the exemptions in the regulation to use non-organic PRM. Skal needs to be strict when granting derogations and ensure that the system of derogations is not abused. It must be worthwhile for the PRM producers to invest into organic varieties.

A complete and up-to-date Biodatabase

Lastly, an important tool to increase the use of organic PRM in the Netherlands is the Biodatabase, this will be elaborated on in the next chapter. The Biodatabase is the Dutch national platform on which the availability of organic PRM on the market is listed. Having the complete offer of all PRM producers on the Biodatabase is important to limit the amount of derogations granted. A well-organized website, with a coherent input is the most efficient way for all stakeholders to make use of the database.

7. Organic Seed Databases

7.1 The National Annex

A National Annex is a list of species and sub-species for which sufficient organic propagated seed or vegetative propagating material is available and (in principle) organic farmers are unable to receive derogations to use non-organic PRM. Given the strong Dutch seed sector, the first National Annex was established in the Netherlands in 2004. Anno 2019 also Germany, France, Luxembourg, Sweden, Belgium, and Switzerland developed a similar system, adapted to national conditions (Raaijmakers & Schäfer, 2019). The Dutch National Annex is public and can be found at www.biodatabase.nl.

Every autumn, at the request of the Ministry of Agriculture, Nature and Food Quality, expert groups for organic PRM get together. The role of the expert groups is to advise the government (competent authority) about which (sub)species can be placed on the National Annex - who then go on to make the final decision. There are four expert groups: one for open field horticulture crops, one for glass house crops, one for arable crops and one for vegetative propagating material. These groups consist of people involved in the seed sector and cultivation, the administrator of the Biodatabase, and an expert from Bionext. A final check of this report is done by the control authority Skal. Herbs are discussed in the groups for open field horticulture crops and the one for glass house crops.

7.2 The Dutch Biodatabase

As not all crops are on the National Annex, two extra categories have been created to make sure that the available organic PRM is used and that derogations are only granted when it is not available.

Category 1(National Annex): organic PRM is sufficiently available; no derogation possible
Category 2: organic PRM is available, but not sufficient; derogation is possible*
Category 3: no organic PRM available; general derogation
*When a crop is listed on category 2, and the variety of organic PRM requested is not available, a derogation can be granted by Skal to use non-organic PRM.

The Biodatabase shows the offer of organic seeds and vegetative propagation material available to the Netherlands, but suppliers are not limited to Dutch companies. When international companies have a Skal certification, or an equivalent certificate from the country, they are allowed on the database. Currently, there are German, Italian and Belgian companies on the Biodatabase.

There is a database manager from Naktuinbouw who PRM producers can report their offer to. The Ministry decided that the Naktuinbouw should be in charge of the database to check the varieties that are offered. Registration on the Biodatabase is not compulsory and there is nobody who is responsible for recruiting companies for the Biodatabase, so not all producers are registered. The idea is that PRM producers benefit from having their offer on the database and therefore the responsibility lies with them. Once registered, PRM producers are legally required to keep the information up to date by reporting changes in availability. However, in practise it appears that PRM producers do not always notify the Biodatabase of changes and the information on the database is a few years old and sometimes incorrect. Taking crops off the Biodatabase puts PRM producers at a disadvantage as it might affect the category placement of the crop and increase the amount of derogations granted.

The current solution to this, is that there is an option to notify the Naktuinbouw and corresponding PRM producer that the listed supply is not available. The Naktuinbouw then takes the offer off the Biodatabase, and when this greatly changes the total offer of the crop, the placement on the concerned category is discussed in the expert group meeting. In practise however, it appears that this option is not always used as contact between PRM producers and their clients is direct and the Biodatabase is not always used as an intermediary.

It seems as if no parties are responsible for the upkeep of the Biodatabase and there are no legal requirements for PRM suppliers to keep their offer up to date. As a result, the Biodatabase

incomplete and outdated, and Skal does not always have the correct information when granting derogations.

7.3 Herbs on the Biodatabase

The Dutch National Annex of 2020 includes all herbs for the fresh market, except for basil, lavas and parsley. All herbs for the industrial use are placed on category 2.
In 2019, derogations were granted for the use of conventional PRM for borage, caraway, chicory, chives, coriander, dill, fennel, lemon balm, marjoram, parsley root, peppermint, ribwort plantain and wild marjoram/oregano.

Appendix 1 includes a list of herbs which are currently on the Biodatabase, including the varieties. Not all varieties listed are currently (immediately) available, some of them are only available on request or have been registered a long time ago and are not produced anymore. This list does not include all herbs that exist, when a herb is not on the list, there has never been a company who produced organic PRM for this herb which can be supplied to the Netherlands. However, there are also herbs which are used in organic production which are not on the database, such as hedge bedstraw (glad walstro) for grass seed mixtures or redvein dock (bloedzuring). These should be placed on category 3.

A difference is made between organic herb PRM for the “fresh market” and for “industrial” use on the Biodatabase, based on the supply chain. This division was once determined by the expert group. See Figure 8 for an example of the layout on the Biodatabase. Skal defines the “fresh market” as the production of fresh herbs in pot, and “industrial” is meant for large scale outdoor cultivation for an industrial purpose. Most PRM for the “fresh market” falls under category 1. PRM for “industrial” use is on category 2, however at the moment there is no supply for any herb under the type “industrial”. Which is strange, as organic PRM producers claimed to also supply to the industrial market. This is probably due to the layout of the registration form, there is no option for PRM producers to specify whether their offer is for the fresh or industrial market and the offer automatically falls under “fresh market”. As there is currently no offer under “industrial”, it is not clear which varieties or types, under which circumstances, should be placed under “industrial”.

Thyme / Thymus vulgaris L.

Common thyme fresh market

This is a category 1 (sub)crop. It is not possible to apply for derogation for the use of non organic propagating material.

Variety name	Selection	Supplier	Available from	BIO/Demeter	
Ayelet		Hazera Seeds B.V.	10/2/2015		✉
Gewone tijm (stek)		Biological Youngplants	1/1/2017		✉
Thijm		De Bolster B.V.	1/1/2014		✉
Thymus vulgaris		Bingenheimer Saatgut AG	1/1/2014	Yes	✉
Thymus vulgaris		De Bolster B.V.	1/1/2014	Yes	✉

✉ Mail us when this variety appears to be no longer available *

Common thyme industrial

This is a category 2 (sub)crop. It is possible to apply for derogation for the use of non organic propagating material. (Apply for derogation)

Variety name	Selection	Supplier	Available from	BIO/Demeter	
Tijm industrie: onvoldoende materiaal beschikbaar		tbv Bio-database	9/29/2016		✉

Figure 8 Example of thyme on the Biodatabase

A differentiation is also made when the offer on the Biodatabase is vegetative propagation material instead of seed. As can be seen in Figure 8, “stek” is included which means cutting.

Regarding the variety names of herbs listed on the database, there is an inconsistent method of registration. For example, for thyme Figure 8 shows how only one variety name is used and the other four offers listed are not real variety names. This is due to the fact that herbs are not subject to registration on the EU Plant Variety Database and do not have an official variety name. This will be further elaborated on in chapter 7.5. Herbs are registered with the name provided by the PRM supplier, which is used on their website or on their packaging.

Another market which requires organic herb seeds is not for human consumption but for forage, as an ingredient in grass seed mixtures. In the Netherlands, it is becoming popular to include herbs in farmers’ grasslands. With benefits including higher biodiversity in the field, improved herbage quality with a beneficial influence on the animal’s health and better marketing of products regarding taste or food quality.

For grass seed mixtures, large quantities of herb seeds are needed and in general the quality requirements are lower. For example, uniform germination, flavour, dry matter content, or durability when cut are not as important as for the herbs for human consumption. Currently, the organic seeds available by seed suppliers on the Biodatabase are meant for herbs for human consumption, but the regulation applies to all markets. In practice, herb seeds needed in grass seed mixtures are often supplied by different kinds of seed suppliers, not those listed on the Biodatabase. Again the problem arises that there are no official variety names for the different types of herb seeds, sometimes there is only one type per crop. In that case, a derogation for the use of non-organic seed will not be granted until all the organic seed of this crop is sold out. A consequence can be that seeds intended for the consumer market end up in grass seed mixtures.

7.4 OrganicXseeds

OrganicXseeds, managed by the Soil Association, working in partnership with FiBL DE, is the most commonly used organic seed database in Europe which regulates the organic seed supply for Ireland, Denmark, Germany, Switzerland, the UK, Belgium, Luxemburg and Sweden.

Herbs can be easily identified with the “category search” option which includes a “herbs and spices” selection (Figure 9). At the moment, the website contains 193 herbs and spices. Figure 10 is an example of how the database organicXseeds lists the supply of organic seeds. Each crop in this category has two selection types “Seeds only available in small quantities” and “Not specified”.

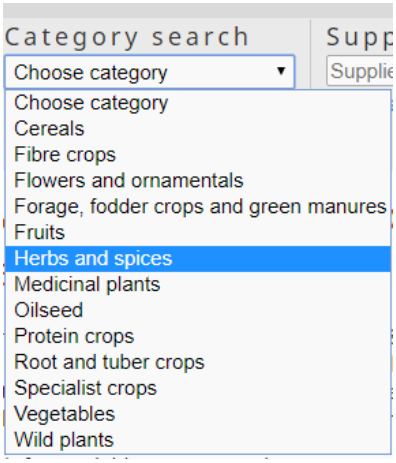

Figure 9 Example of the category search function on organicXseeds

Some other crops have more selection types, for example apple additionally has “Cider”, “Cooking” and “Eating” (all of these have the same variety listed though). However, this is not consequent on organicXseeds, for example grapes do not have these selection types but are listed as “Grape (Table)” and “Grape (Wine)”. If one of these methods is chosen and consequently used throughout the database, it could be useful for herbs to be listed with such a differentiation too. For example:
Apple, selection types: “Cider”, “Cooking” and “Eating”
Grape, selection types: “Table” and “Wine”
Parsley, selection types: “Fresh”, “Dried” and “Forage”

The same varieties can be listed under multiple selection types but it is important that the available volume and quality are suitable for the concerned selection type.
Furthermore, on organicXseeds additional information about the seeds can be added, such as type, quality and certification, however this is often not specified, see Figure 10.

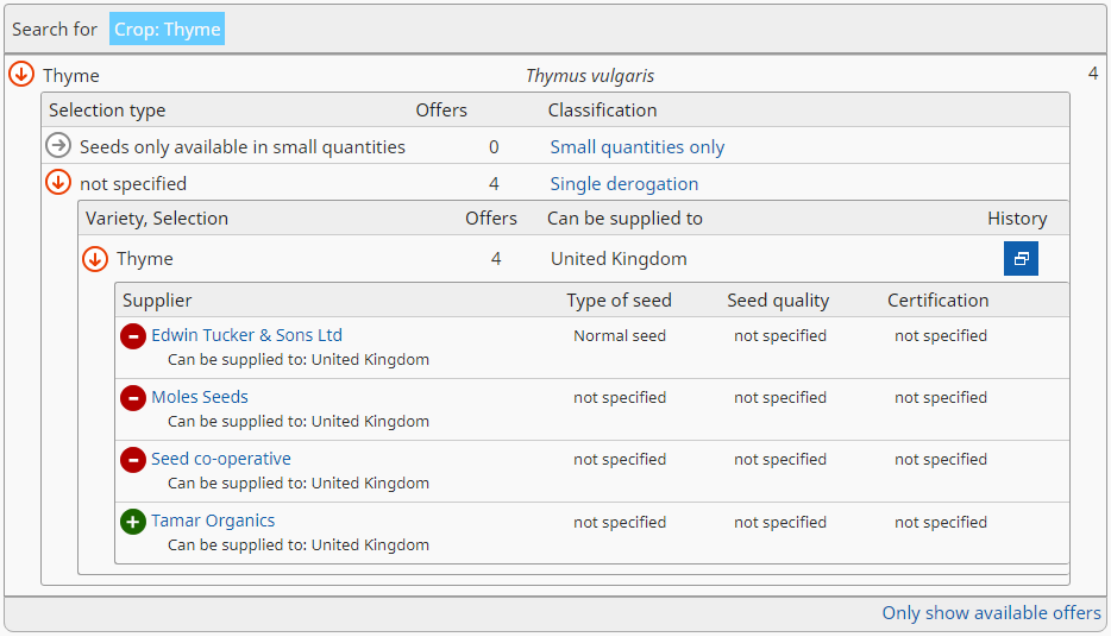

Figure 10 Example of thyme on organicXseeds for the UK

7.5 EU Plant Variety Database

The placement of agricultural crops on seed databases is dependent on the registration of varieties. In order to market a variety of an agricultural product within the EU, the variety must first be registered on the EU Plant variety database, also known as the Common Catalogue of varieties of agricultural plant and vegetable species. When this catalogue was first published in 1975, an inventory of the current crops marketed in the EU was performed and included some herbs. Herbs are actually not subject to registration, however parsley, chervil and chives are on the catalogue due to this assessment in the beginning. The few herbs that are registered on the EU Plant variety database, do not have proper variety names listed (Figure 11). Other descriptions are used instead of a variety name. These descriptions are not consistent within the EU Plant variety database, between different herbs or between different databases in European countries.

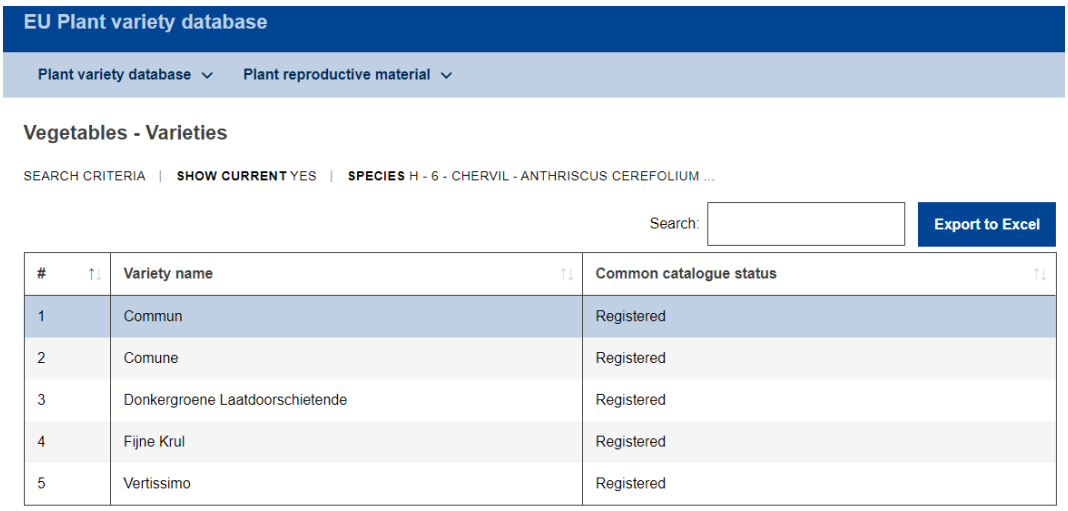

Figure 11 Chervil on the EU Plant variety database

8. Recommendations for the Biodatabase

The organic seed database is an important tool to promote the use of organic PRM and ensures transparency in the market (Solfanelli et al., 2019). Its effectiveness is essential for the development of the organic seed market. The databases currently in place fulfil legal requirements, however have many shortcomings and their use is questioned by those involved. As this study focusses on the Dutch market, several recommendations are made for improvements of the Biodatabase.

A complete and up to date database

If organic seed from a certain variety is available on the market, but not offered on the Biodatabase, farmers can receive a derogation for the use of untreated, non-organic PRM. Listing all available organic PRM in the national database is therefore the first step to limit the number of derogations. At the moment, in the Netherlands, PRM companies are responsible for keeping the supply on the Biodatabase up to date. They are bound to do this by an agreement made with the Biodatabase manager. However, in practice this does not work very well. It is in the benefit of the suppliers to keep varieties on the Biodatabase, even when they are no longer available in organic quality. In that case, the customer (farmer) might call the PRM producer and the supplier can offer them another variety. At the same time, some organic seed suppliers put their offer only on their own website and not on the Biodatabase, leading to unnecessary derogations.

Therefore, the Biodatabase manager is recommended to send email alerts to PRM producers to remind them to update their offer. There should also be a consequence for when this is not done. For example, after a certain amount of time, if PRM producers have still not sent an updated version of their supply, the company should be temporarily taken off the Biodatabase until an up-to-date version of their offer is submitted.

It would be even better if companies had their own log-in to the database to update the offer themselves. Then, the database could have an activity alert function which automatically creates an email alert to remind PRM producers to update their offers if they were not active on the database for a certain period of time (Fuss et al., 2018). The Naktuinbouw would still be in charge by doing a final check and approving the producers' input.

It is also important that all PRM companies are listed on the Biodatabase. Skal has a database with all the registered organic PRM producers, therefore they know who should be on the Biodatabase. If they are not willing to share this information, they should be responsible to create awareness about the existence and importance of the Biodatabase amongst all organic PRM producers.

A fourth category

At the moment, crops are placed on one of the three categories in the database of which the placement is determined by expert groups. In France, a fourth category is included of crops which will be added to category 1 in the coming 2-3 years (Solfanelli et al., 2019). The purpose of this is to provide involved stakeholders with the opportunity to plan ahead. This could be a useful step-by-step approach to reach 100% organic PRM use for all crops. This would be an incentive for both the PRM producers and the farmers to prepare for the use of organic PRM. This is something that could be discussed by the expert groups.

The quantity of PRM offered

Including the quantity of PRM available is also a discussion point at the moment because it is a requirement in the new organic regulation. This is not recommended as PRM producers list their supply on multiple databases so the values listed will not reflect the real amount available. This is also

sensitive business information and PRM producers cannot be obligated to make this information public.

A category for herbs

For herbs specifically, there are several recommendations too. The “category search” function of organicXseeds should be taken over by the Biodatabase and called “gewasgroep” for example. For herbs in particular this would be useful, but its use is also beneficial to other categories of crops. OrganicXseeds has the following categories: cereals, fibre crops, flowers and ornamentals, forage – fodder crops and green manures, fruits, herbs and spices, medicinal plants, oilseed, protein crops, root and tuber crops, specialist crops, vegetables and wild plants. When a specific category is chosen, all related crops are listed.

The naming of herb varieties/types

The main issue encountered for herbs on all databases, is that there are no official variety names. Other, inconsistent names are filled in to be able to place the offer on the database. One alternative should be chosen and used consistently. For example, for thyme under “variety name” it should say ‘thyme / thymus vulgaris L.’, exactly the same as in the title, and under “type” it could mention if the offer concerns seeds or cuttings. See Figure 5 for an example of how herbs are recommended to be displayed on the Biodatabase.

Differentiation between the use

These recommendations are the most important ones for herbs specifically. First of all, the current differentiation between the segments “fresh market” and “industrial” is not properly used. Due to the fact that producers are not provided with the option to specify for which market their offer is suitable, all input currently falls under the fresh market even though there is supply for the industrial market. This leads to unnecessarily granted derogations for industrial use. Therefore, a recommendation is to include this selection in the registration form so that producers are aware of this differentiation for herbs.

Secondly, for herbs it appears that different in varieties/types are needed depending on the end product. So instead, the segments “fresh”, “dried” and “forage” are recommended (Figure 12). Definitions of these segments are important so that the PRM producers, as well as the buyers, are aware of the differences in varieties/types for these segments. For each herb, the placement of the variety/type can be determined based on the availability of organic PRM. However, it is important that only large quantities available are listed on the database.

Furthermore, it is also important that when a segment (fresh, dried or forage) remains empty, or there are no suitable varieties, it is moved to category 3. At the moment, industrial producers need to apply for a derogation even though there is no supply listed under “industrial” at all. This is not how the system it is supposed to work.

Lastly, when a derogation is granted it is important to indicate for which segment this is. The published list of derogations granted yearly should include for which of the three segments the organic PRM was needed. This is important information for companies producing organic PRM to identify opportunities.

Thyme / thymus vulgaris L.

Fresh market

This is a category 1 (sub)crop. It is not possible to apply for derogation for the use of non organic propagating material.

Variety name	Selection	Type	Supplier	Available from	EKO/Demeter	
Ayelet		Seed	Hazera Seeds B.V.	10/2/2015	No	✉
Thyme / thymus vulgaris L.		Cutting	Biological Youngplants	1/1/2017	No	✉
Thyme / thymus vulgaris L.		Seed	De Bolster B.V.	1/1/2014	Yes & No	✉
Thyme / thymus vulgaris L.		Seed	Bingenheimer Saatgut AG	1/1/2014	Yes	✉

✉ Mail us when this variety appears to be no longer available

Dried market

This is a category 2 (sub)crop. It is possible to apply for derogation for the use of non organic propagating material. (Apply for derogation)

Variety name	Selection	Type	Supplier	Available from	EKO/Demeter	
Thyme / thymus vulgaris L.		Seed	..	..	..	✉

✉ Mail us when this variety appears to be no longer available

Forage

This is a category 3 (sub)crop. A general derogation applies. You do not need to apply for derogation for the use of non organic propagating material.

Variety name	Selection	Type	Supplier	Available from	EKO/Demeter	

✉ Mail us when this variety appears to be no longer available

Figure 12 Example of the recommended display for organic PRM supply on the Biodatabase.

9. Discussion

Due to time constraints, it was not possible to gather all information from stakeholders and identify the whole supply chain. Small players were willing to share information, however the larger or more commercial a company was, the less information they were willing to share. The most challenging was to get information about the origin of organic herbs in products such as soups and sauces. I was not able to get a hold of the right people at Unilever for Unox and Knorr for example and Albert Heijn could only share that their organic herbs come from both EU as non-EU countries. Also, for the information that I did receive from stakeholders, it was not possible to check whether the information was indeed correct.

Furthermore, it is peculiar that there are no organic fresh cut herbs in the conventional supermarkets. Future research could look into the suppliers of fresh cut herbs to find out what the bottleneck is in organic production. It could be high costs because of the pressure of insects and high costs of organic fertilizer. However, farmers of outdoor cultivated organic herbs in the Netherlands claim that there are generally no problems with pests. It could also be due to hydroponic production which cannot be certified organic.

With regards to the Biodatabase, the main issue identified for herbs was that there is a differentiation between two different markets – however these are not used. All supply of organic PRM for herbs is automatically placed under “fresh” and therefore “industrial” is empty at the moment. Even though organic PRM producers claim that they do supply to the industrial market. Most derogations currently granted are assumed to mostly be for herb PRM for industrial use because Skal does not see any supply listed. This an assumption as the list of derogations granted does not specify the corresponding market. It would be interesting to see if the list of derogations will differ much with the improvements mentioned for the Biodatabase.

Other, minor, but essential adjustments are necessary for the Biodatabase to function to its fullest extent and avoid incorrect derogations. However, there are costs involved in taking up these recommendations. For the necessary derogations, PRM producers could look into the yearly derogations granted. However, they will need some assurance that their supply will be used if they increase production. Hopefully, these recommendations will contribute to that. Furthermore, it is important that these issues are tackled EU wide as supply chains and regulation are on European level.

10. Conclusions

An assessment of the current use of organic Plant Reproductive Material was performed for the organic herb sector in the Netherlands. The aim was to identify gaps and opportunities to reach 100% organic PRM use in the Dutch organic herb sector.

Information was exchanged with several stakeholders in the (organic) herb sector, and three supply chains were determined:

Fresh in pot
Vegobel and Especia are the two large producers of fresh organic herbs for the Netherlands - organic PRM is mostly used. Buysman Kruiden is the only conventional producer of fresh herbs in pot in the Netherlands and supplies to two supermarket chains.

Fresh cut
The production of organic fresh cut herbs is small, these are only available in organic supermarkets supplied by Fresh Organic Choice, Greenfresh and PuurNL. Conventional supermarkets only supply non-organic cut herbs. Production mostly takes place outside of the Netherlands and the PRM use is not known.

Dried herbs
Organic supermarkets have a large assortment of organic dried herbs from Het Blauwe Huis, organic PRM is used. In conventional supermarkets, the assortment of organic dried herbs in jars is small, these are mainly from Verstegen, Bio+ or a private label of the supermarket. Insufficient information was gathered to make conclusions about the PRM use.

Organic regulation regarding production, the use of organic PRM and the system of derogations was reviewed. The National Annex and the Biodatabase were explained and the registration of herbs was examined. Recommendations were made for the Biodatabase as this study focused on the Netherlands. The main idea was that those involved need to take more responsibility in the upkeep of the database; Naktuinbouw related to the input, Skal about the awareness of its existence amongst PRM producers and the PRM producers in keeping their offer up to date. The discussion about possibly including a fourth category is suggested. Also, a “category search” function with all the herbs listed under the category “herbs” and consistent way to submit the input when there is no official variety name. Lastly, a necessary differentiation between organic PRM suitable for the “fresh”, “dried” and “forage” market instead of the current differentiation between “fresh” and “industrial”. Whereby it is important for the organic PRM producers to select the segment(s) for which their supply is suitable.

Yearly, many derogations are granted for the use of non-organic PRM for herbs. Organic PRM producers are recommended to approach their customers purchasing conventional PRM for organic production to discuss options possible organic alternatives. However, not all producers want to use organic PRM out of principle, therefore strict regulation and supervision is necessary. It is expected that there are opportunities to develop organic PRM for outdoor cultivation, fresh cut herbs and for organic seeds in grass seed mixtures.

References

Boshnakova, M. (2018). Organic Market Update Bulgaria. Global Agricultural Information Network. GAIN Report Number BU1811.

CBI. (n.d.a). Exporting fresh herbs to Europe. Retrieved from https://www.cbi.eu/market-information/fresh-fruit-vegetables/fresh-herbs/europe/ on 20 January 2020.

EGTOP. (2013). Final Report On Greenhouse Production (Protected Cropping). Expert Group for Technical Advice on Organic Production.

Ende, D. (2019). Organic agriculture is growing steadily. Prophyta annual. Retrieved from https://plantum.nl/wp-content/uploads/Organic-agriculture-is-growing-steadily.pdf?x14219 on 7 January, 2020.

Fuss, F., Kovács, T., Raaijmakers, M., Schäfer, F., Gatzert, X., Brühl, K., Petitti, M. & Bocci, R. (2018). How to implement the organic regulation to increase production & use of organic seed. Booklet produced within the LIVESEED project. Retrieved from https://www.eco-pb.org/fileadmin/eco-pb/documents/LIVESEED_publications/Liveseed-booklet_on_implementation_of_existing_organic_regulation_with_regard_to_seed.pdf on 7 January, 2020

Hubbard, K. & Zystro, J.(2016). State of Organic Seed. Organic seed alliance.

Kurrig, M., Schäfer, F., Aigner, M. & Messmer, M. (2018). Organic seed databases for increasing the transparency and use of organic seed in Europe. The Organic Standard, issue 175/2018. Retrieved from https://www.liveseed.eu/wp-content/uploads/2018/06/Kurrig_-organic-seed-databases-2018.pdf in 24 February, 2020.

Peperkamp, M. & Schotel, P. (2016). CBI Product Factsheet: Fresh Herbs in Europe. CBI Market Intelligence, Ministry of foreign affairs.

Raaijmakers, M. & Schäfer, F. (2019). Report on Political Obstacles and Bottlenecks on the Implementation of the Rules for Organic Seed in the Organic Regulation. Retrieved from https://www.liveseed.eu/wp-content/uploads/2019/10/LIVESEED_D1.9_M1.9_Political_Obstacle_Report_FINAB.pdf on 18 November, 2019.

Solfanelli, F., Ozturk, E., Zanoli, R., Orsini, A. & Schäfer, F. (2019) The State of Organic Seed in Europe. Liveseed.

Spicer, F. (2003). Herbs vs. Spices. Iowa State University, Department of Horticulture. Retrieved from https://hortnews.extension.iastate.edu/2003/8-22-2003/herbsnspices.html on 11 December, 2019.

Worsley, A., Wang, W., Ismail, S., & Ridley, S. (2014). Consumers' interest in learning about cooking: the influence of age, gender and education. *International Journal of Consumer Studies*, 38(3), 258-264.

Appendix 1

A list of all herbs including varieties offered on the Biodatabase and the granted derogations from 2018 and 2019. The varieties which are on the Biodatabase but for which a derogation was granted are highlighted in red.

Herb	*Dutch name*	*Latin name*	*Varieties or types offered*	*Derogations 2018*	*Derogations 2019*
Aztec herb	Aztekenkruid	Lippia dulcis Trevir.	-		
Basil	Basilicum	Ocimum basilicum L.	Adi, Aroma 1 Aton Basilicum (stek) Basilicum kaneel Basilikum grossblattrig Basilikum mittelgrossblattrig Basilikum rotblattrig Buschbasilikum Edwina, Gabriella Genovese, Grace Isabella, Nufar Red Rubin Super Sweet Ashalim Sweet Aroma Thai Basilikum Zimtbasilikum	Marian	Basil Floral Spines White
Bittercress	Barbarakruid	Barbaraea praecox (Sm.) W. T. Aiton	Winterkresse		
Black caraway	Zwarte komijn	Nigella sativa L.	Schwarzkümmel		
Borage	Bernagie	Borago officinalis L.	Borretsch		Borage
Burnet	Pimpernel	Sanguisorba minor Scop.	-	Kleine pimpernel, Pimpinell	
Caraway	Karwij	Carum carvi L.	Kümmel		Coco Rio, Karwij, Record
Chicory	Chichorei	Cichorium intybus L.	-		Bladtype Spadonia, Ligustrum Ovalifolium, Malachite
Chinese chives	Chinese bieslook	Allium tuberosum Rottl. ex Spreng	-		
Chives	Bieslook	Allium schoenoprasum L.	Fijne Middelgrof Gonzales Polycross	Biggy, Divonne, Dolores, Marlau, Polyfit, Polyup, Twiggy, Garlic chives	Divonne, Dolores, Marlau, Polystar, Polyup, Polyvert, Polyvit, Twiggy
Chop suey greens	Gekroonde ganzebloem	Chrysanthemum coronarium L.	Speisechrysantheme		
Common sorrel	Zuring	Rumex acetosa L.	Kultursauerampfer		
Coriander	Koriander	Coriandrum sativum L.	Caribe Coriandrum sativum Marino Rani		Burgundy, Karios, Lonicera

					Nitida Maigrun
Curry plant	Kerriekruid	Helichrysum angustifolium (Lam.) DC.	-		
Dill	Dille	Anethum graveolens L.	Diana Ella Tetra Dill	Ceres, Goldkrone	Topaz
Dragon	Dragon	Artemisia dracunculus L.	Lennart Tarragon	Lennart	
Fennel	Venkel	Foeniculum vulgare Miller	Finale Fino Orion Perfection Preludio Rondo Solaris		Antares, Bronze Fennel, Dragon, Gemini
Field mint	Akkermunt	Mentha arvensis L.	-		
Garden chervil	Kervel	Anthriscus cerefolium (L.) Hoffm	Fijne krul Massa Venena		
Garden Cress	Tuinkers	Lepidium sativum L.	Cressida Cresso Einfache Grootbladige Victoria		
Garden Orache	Tuinmelde	Atriplex hortensis L.	-		
Hyssop	Hyssop	Hyssopus officinalis L.	Ysop		
Lavas	Maggiplant	Levisticum officinale Koch	Liebstock	Liebstock	
Lavender	Lavendel	Lavandula angustifolia Mill.	-		
Lemon balm	Citroenmelisse	Melissa officinalis L.	Citrina		Citroenmelisse
Lemon basil	Lemoen basilicum	Ocimum × africanum Lour. / Ocimum × citriodorum Vis.	-		
Lemon thyme	Citroentijm	Thymus citriodorus (Pers.) Schreb.	-		
Lemon verbena	Citroenverbena	Lippia citrodora Kunth	-		
Marjoram	Majoraan	Majorana syriaca (l.) Kostel.	-	Marjoram	Belleveu, Evangeline, Majoran
Mexican dragon	Mexicaanse dragon	Tagetes lucida Cav.	-		
Mint	Munt	Mentha	-		
Olive herb	Olijfkruid	Santolina viridis	-		
Oregano thyme	Oregano tijm/grote tijm	Thymus pulegioides L.	-		
Parsley root	Wortelpeterselie	Petroselinum crispum var. Tuberosum	Oaborne Halblange	Arat, Hermes	Arat, Artica, Biltstar, Comanche, Esparcette, Faraday, Halflange eagle, Niger,

					Purplette, Tillage Radisch
Parsley	Peterselie	Petroselinum crispum	Gewone Snij 2 Gewone Snij 3 Gigante d'Italia Grune perle Moskrul 2	Gladde peterselie (rialto), Felicia, Laura, Orfeo, Peione, Prairie, Rina, Divers & Onbekend	Afrodite, Arar, Laica, Laura, Paloma, Peione, Prairie, Rialto, Rina
Peppermint	Pepermunt	Mentha x piperita	-	Mentha piperita, pfefferminze	Bonita, Emmer, KX0814CKN, Orleans, Pfefferminze
Pineapple sage	Ananas salvia	Salvia elegans Vahl	-		
Ribwort plantain	Smalle weegbree	Plantago lanceolata L.	-		Smalle weegbree
Rosemary	Rozemarijn	Rosmarinus officinalis L.	-		
Sage	Salie	Salvia officinalis L.	Ceres Fanni Marva		
Satureja	Bonenkruid	Satureja hortensis L.	Bohnenkraut gewohnliches Einjahrig		
Satureja montana	Bergbonenkruid	Satureja montana L.	-		
Small curry plant	Klein kerriekruid	Helichrysum italicum (Roth) G. Don	-		
Spearmint	Spijkmint/Marokkaanse munt	Mentha spicata L.	-		
Stevia	Stevia	Stevia rebaudiana (Bertoni) Bertoni	Stevia/Zoetkruid (stek)		
Thyme	Tijm	Thymus vulgaris L.	Ayelet Deutscher Winter Faustini		
Watercress	Witte waterkers	Nasturtium officinale R.Br. Rorippa nasturtium-aquatica (L.)	-		
Wild marjoram/ oregano	Oregano/Wilde marjolein	Origanum vulgare L.	Greek Oregano/Dost Oreganum heracleoticum Sweet Zaatar	Syriaca, Oregano vulgaris	Superpopeye
Woodruff	Lievevrouwebedstro	Galium odoratum (L.) Scop	-		
Yarrow	Duizendblad	Achillea millefolium L.	-		

Appendix 2

The offer of organic PRM for herbs by companies on the Biodatabase.

Herb	*Kruid*	*Bejo Zaden*	*Bingen heimer*	*Biological Youngplants*	*De Bolster*	*Hazera Seeds*	*HEM Zaden*	*Hild Samen*	*Vitalis Zaden*	*Total offer*
Aztec herb	Aztekenkruid			1						1
Basil	Basilicum		1	1	1	1				4
Bittercress	Barbarakruid		1							1
Black caraway	Zwarte komijn		1				1	1	1	4
Borage	Bernagie		1					1		2
Burnet	Pimpernel		1					1		2
Caraway	Karwij		1		1		1	1		4
Chicory	Cichorei									0
Chinese chives	Chinese bieslook		1		1					2
Chives	Bieslook		1		1					2
Chop suey greens	Gekroonde ganzebloem		1				1	1	1	4
Common sorrel	Zuring		1							1
Coriander	Koriander	1	1		1	1		1	1	6
Curry plant	Kerriekruid			1				1		2
Dill	Dille		1		1					2
Dragon	Dragon		1	1						2
Fennel	Venkel		1				1			2
Field mint	Akkermunt			1						1
Garden chervil	Kervel		1		1					2
Garden cress	Tuinkers		1		1		1	1		4
Garden orache	Tuinmelde									0
Hyssop	Hyssop		1		1			1	1	4
Lavas	Maggiplant		1		1			1		3
Lavender	Lavendel		1	1	1					3
Lemon balm	Citroenmelisse		1	1	1					3
Lemon basil	Lemoen basilicum						1	1		2
Lemon thyme	Citroentijm			1						1
Lemon verbena	Citroenverbena			1						1
Marjoram	Majoraan		1	1						2
Mexican dragon	Mexicaanse dragon			1						1
Mint	Munt			1						1
Olive herb	Olijfkruid			1				1	1	3
Oregano thyme	Oregano tijm/ grote tijm			1						1
Parsley root	Wortelpeterselie		1				1	1		3
Pasley	Peterselie	1			1					2
Peppermint	Pepermunt			1			1			2
Pineapple sage	Ananas salvia			1			1	1	1	4
Ribworth plantain	Smalle weegbree									0
Rosemary	Rozemarijn			1	1					2
Sage	Salie		1	1	1					3
Satureja	Bonenkruid		1		1		1	1		4

Satureja montana	Bergbonenkruid		1			1	2
Small curry plant	Klein kerriekruid		1				1
Spearmint	Spijkmint/ Marokkaanse munt		1		1		2
Stevia	Stevia		1			1	2
Thyme	Tijm	1	1	1			3
Watercress	Waterkers	1					1
Wild marjoram/ oregano	Oregano/ Wilde marjolein	1	1				2
Woodruff	Lievevrouwebedstro		1				1
Yarrow	Duizendblad						0