

Report [better-b.eu](https://www.better-b.eu) 2024 – 2025

Observation period 2024 + 2025 (till 17 August 2025)



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January 2026

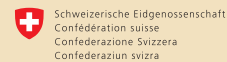
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Summary

Beeplants.eu is a citizen science baseline study, aiming to address the current status of the pollinating insects of the *Apidae* superfamily: honey bees, solitary bees, and bumblebees. Additionally, hoverflies and “other insects” were recorded. The observations and data analyses over the period April 2024 to 17 August 2025 are reported here. Currently, the data of beeplants.eu is obtained by 451 citizen scientists from 18 countries. They submitted 17842 observations, covering 104 plant species. All plants observed are visited by various pollinating insects, both simultaneously and solely per observation. The criterion for data analyses of > 10 observations per plant, regardless of the location, was met with 74 plants. Of the one-insect-observations, the insects are in descending order: honey bee, bumblebee, hoverfly, and solitary bee, respectively. This reflects the abundance; the most common are the colony insects, then the hoverflies, abundant and no nest, and last the solitary bees. The latter is mostly observed in combination with other insects. The data analyses showed that the combination of simultaneous visits by honey bee and bumble bees was recorded on 45 out of 74 plants, and honey bee and hoverfly on 30 plants. The combination of bumblebee and hoverfly was recorded on 10 plants. Observations of simultaneously three and four pollinators were made on 42 and 13 plants, respectively. Pollinating insects are observed at the temperature range -4 to +4 °C, indicating the impact of microclimates with higher temperatures in certain sunny sheltered spots than the ambient temperature. The total number of insects per week varies, depending on the number of observations, time of the day and weather conditions. The total weekly and weekly means of the Copenhagen and Oisterwijk data show that the general patterns and ratios of pollinating insects are similar in the three subsequent weeks per location and different between the locations, indicating that the local conditions for pollinating insects, both for weather and housing conditions, differ between the locations. Similarity between locations, both for the entire study period and by week, was calculated with the Bray-Curtis Dissimilarity index (BC). This BC is a number that shows whether observations at separate locations have a certain degree of similarity in numbers and ratios of the pollinating insect species on the same flowers; 0 is complete similarity, and 1 is complete dissimilarity. The BC is applied for statistical confirmation of what the data show; the BC`s in this study show clearly that the ratios and numbers of pollinating insects differ per observation. The participating citizen scientists have seen this during plant/insects observations. This shows the value of the ongoing observations and locations in this study. The data of flowering period and of pollinating insects provide input to pollinator modelling and for the Better-B study into the carrying capacity of locations/regions. Furthermore, the citizen scientists make their own bee plant calendar. Many citizen scientists reported their increasing knowledge of the diversity of insects in flowers; the participants noticed a higher variation than presumably expected. Beeplants.eu is part of the EU Better-B study.

Acknowledgement

This study is possible because of the voluntary contribution of the citizen scientists. They deserve a big thank you and the gratitude of me and colleagues who participate in beeplants.eu and Better-B study. The work and commitment of Elena Fine (UAarhus), Xiaodong Duan (UAarhus), Chris Topping (UAarhus), Flemming Vejsnæs (DBF), Ole Kilpinen (DBF) and Matthias Frey (frey-IT) made this study possible, and I am grateful for their work. The study will be continued in 2026.

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Introduction

There is a genuine concern to feed pollinating insects because of the decrease in foraging areas, due to expanding infrastructure, agricultural intensification and climate change. Beeplants.eu aims to start addressing this concern with a baseline measurement of the current status of the pollinating insects. Beeplants.eu is a citizen science study. Citizen scientists record pollinating insects of the *Apidae* superfamily: honey bees, solitary bees, and bumblebees. Additionally, hoverflies and “other insects” were recorded. Determining pollinating insect species to the species level is a super-specialism, and therefore not applicable for a citizen science study. Therefore, the observations are recorded in groups of insects: honeybees, solitary bees, bumblebees, and hoverflies. The citizen scientists are asked to record minimally twice a week the same plants in their garden and/or in the vicinity; for example, during lunch breaks, and submit the data to beeplants.eu. Date, time and location are recorded by default. Beeplants.eu is part of the EU Better-B study. Beeplants.eu is a website that functions like an app.

The data on the flowering period and pollinating insects provide input to the insect pollinator modelling and the Better-B study about the carrying capacity of locations and regions. By participating, the citizen scientists make their own bee plant calendar and are part of a large group of citizen scientists in biology. Many citizen scientists reported their increasing knowledge of the insects in flowers, with a higher variation of pollinating insects than was presumably expected.

The study will be continued in 2026.

Results

This report is about the results obtained from April 2024 till 17 August 2025. Currently, the data of beeplants.eu is obtained by 451 citizen scientists from 18 countries. They submitted 17842 observations, covering 104 plant species. The observations are restricted to the plants listed in the beeplants.eu app. This list contains, till now, 127 nectar and pollen providing plants and is regularly updated based on input by the participants. The data are analysed for solely pollinating insects, combinations of pollinators on plants, temperature ranges, and dissimilarity of observations. The data show that all flowers are visited by various pollinating insects, both simultaneously and in time. Honey bees and bumblebees are observed the most as they live in colonies and therefore present in higher numbers. The criterion for data analyses of > 10 observations was met with 74 plants. The list of observations per plant is presented in the Attachment in Table 6. The study is limited to qualitative data collection, according to the study: citizen science recordings without predetermined observation times and locations.

Participants and number of observations in the period April 2024 to 17 August 2025

The current status of beeplants.eu by 17 August 2025 is: 449 citizen scientists, 17842 observations. The citizen scientist live in Austria (8 citizen scientists CS), Belgium (17 CS), Switzerland (1 CS), Germany (15 CS), Denmark (71 CS), Estonia (31 CS), Spain (29 CS), Finland (6 CS), France (53 CS), UK (1 CS), Greece (1 CS), Ireland (1 CS), Italy (4 CS), Latvia (33 CS), Malta (1 CS), Netherlands (77 CS), Norway (32 CS), Poland (1 CS), Portugal (6 CS) Romania (2 CS) and Sweden (59 CS).

A combination of pollinators on plants

Qualitative data on pollinating insects on plants

The dataset of combinations of pollinating insects is presented in the attachment (Figure IX). The percentages presented are based on the number of observations of pollinating insects on that flower. The honey bee is the most recorded pollinating insect, followed by the bumblebee and hoverfly. The data

of observation of the pollinating insects on 74 plants: honey bee, bumblebee, solitary bee, hoverfly and other insects, e.g. butterfly, are presented in Table 1. Of the one-insect-observations, 70 and 51 observations were made of honey bees and bumblebees, respectively. On 44 plants two-insects-observation were recorded of honey bees + bumblebees. There were 41 and 13 three and four-insect combinations, respectively.

Table 1. Pollinating insects per observations

One insect species per observation	plants	Number of observations
Honey bee (HB)	70 of 74	981
Bumblebee (BB)	51 of 74	800
Solitary bee (SB)	2 of 74	21
Hoverfly (HF)	27 of 74	688
Other insects (OI)	31 of 74	179

Two insect species per observation	plants	Number of observations
Honey bee + bumblebee	44 of 74	396
Honey bee + solitary bee	17 of 74	63
Honey bee + hoverfly	30 of 74	289
Honey bee + other insect	20 of 74	87
Hoverfly + solitary bee	8 of 74	62
Hoverfly + other insects	8 of 74	47
Bumblebee + hoverfly	10 of 74	143
Bumblebee + other insects	6 of 74	10
Solitary bee + other insects	3 of 74	8

Three different insect species per observation	41 of 74	267
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Four different insect species per observation	13 of 74	65
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Other combinations	52 of 74	1215
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Qualitative estimation of pollinating insects on plants

Table 2 shows, per plant, the number of one-insect observations, two-insect observations, three-insect and four-insect observations, other combinations and the total number of observations. In Table 2, the

20 most frequently observed plants are listed. The one-insect-observations are the most common, followed by the two-insect-observations.

Table 2. The top 20 plants with the corresponding one-, two-, three and four-insects observations

plant	number of one-insect-observations	number of two-insects-observations.	number of 3-4 insect observations.	other combinations	number of observations
<i>Origanum vulgare</i>	304	127	0	110	541
<i>Geranium spp</i>	242	105	24	127	498
<i>Buddleja spp</i>	140	50	0	68	258
<i>Lavendula angustifolia</i>	75	57	0	121	253
<i>Echium vulgare</i>	149	52	0	35	236
<i>Heracleum spp</i>	152	40	17	13	222
<i>Rosa spp</i>	96	34	0	57	187
<i>Lamium album</i>	111	0	0	45	156
<i>Borago officinalis</i>	73	35	0	31	139
<i>Hydrangea spp</i>	61	23	14	36	134
<i>Trifolium repens</i>	69	27	11	20	127
<i>Symphoricarpus spp</i>	52	31	8	23	114
<i>Cirsium spp - Carduus spp</i>	45	13	27	23	108
<i>Anemone tomentosa</i>	48	20	0	36	104
<i>Crepis spp</i>	56	18	0	19	93
<i>Lythrus salicaria</i>	33	22	7	24	86
<i>Ligustrum vulgare</i>	29	21	14	21	85
<i>Phacelia tanacetifolia</i>	22	19	13	31	85
<i>Rubus idaeus</i>	27	21	9	25	82
<i>Taraxacum officinale spp</i>	38	11	0	31	80

Pollinating insects' preference for temperature

The temperature ranges applied in this report come from the [ERAS climate data store](#). The ERA5 data contain temperature maps across the whole world with a 10 km resolution in space and an hourly resolution in time. The observation locations, GPS data and time of observation of specific observations are matched. This ensures realistic ambient temperatures are applied in the data analyses. Pollinating insects were recorded in the temperature range -4 to +4 °C. It shows that the microclimate temperatures at the observation locations, for example, gardens, can be significantly higher than the ambient temperature.

Temperature range -4 to 4 °C.

In the -4 to 4 °C. range, the crops on which honey bees were observed mostly were *Acer campestre*, *Prunus avium*, *Eranthis hyematis* and *Prunus domestica*. The bumblebees preferred in this temperature range *Salix spp*, *Fragaria spp* and *Ribes sanguineum*, where the solitary bees preferred *Salix spp* and *Fragaria spp*. The other insects are mostly seen on *Fragaria spp* and *Plantago spp*. No hoverflies were observed in this temperature range. In Figure I, the graphs with the plants per pollinator are shown.

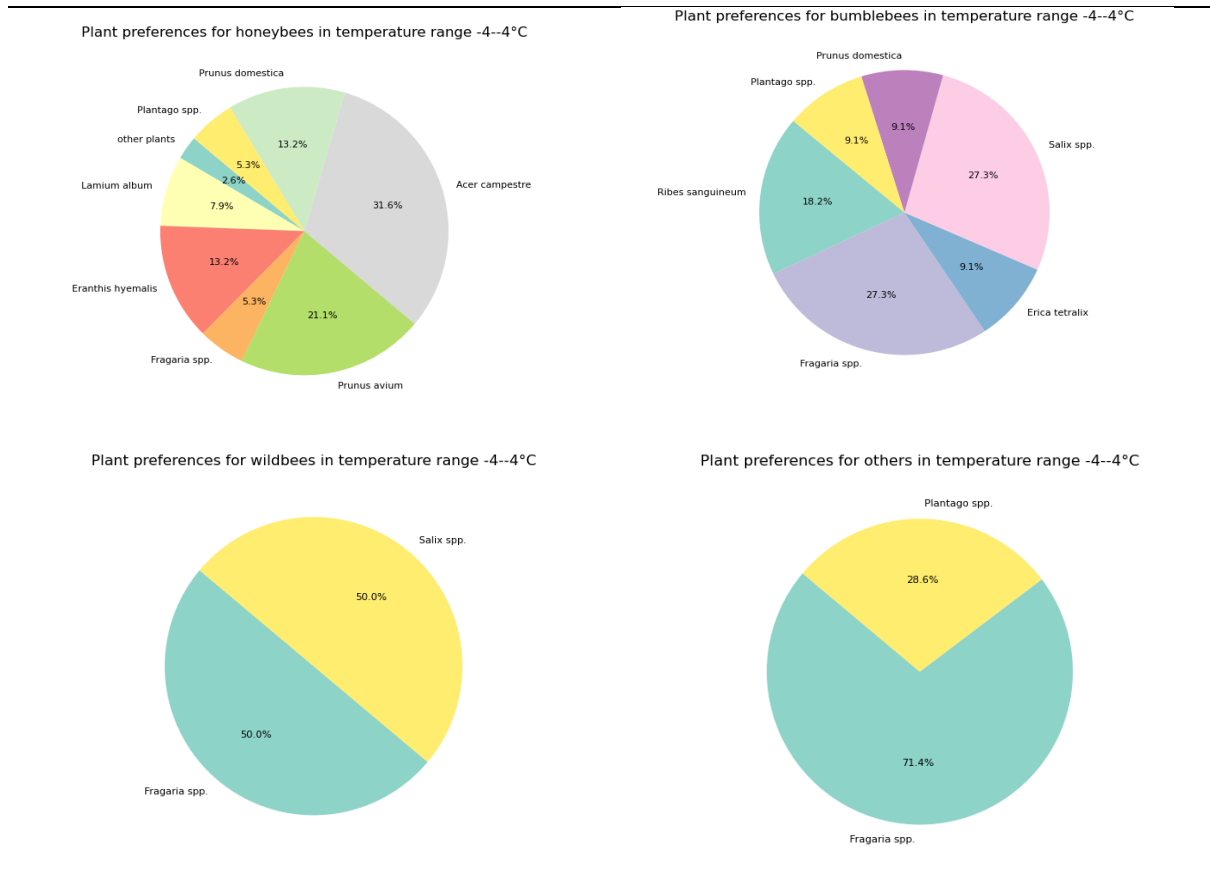
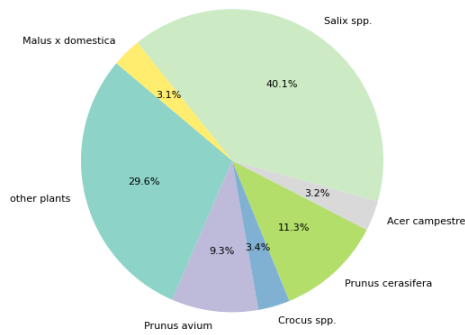


Figure I

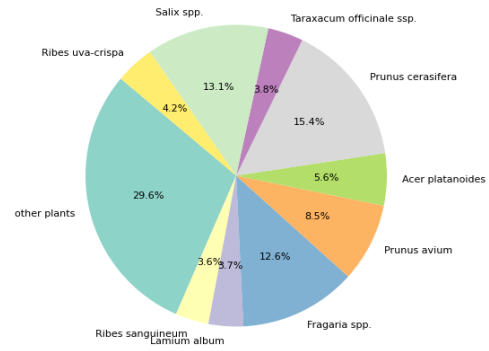
Temperature range 4 to 12 °C.

In the 4 to 12 °C. range, the most preferred plants by the honey bee are *Salix spp* and *Prunus cerasifera*. The bumblebees preferred in this temperature range *Prunus cerasifera*, and *fragaria spp*, where the solitary bees preferred *Taraxacum officinalis*. The hoverflies preferred *Ribes sanguineum*. The other insects are mostly seen on *Fagaria spp*. In Figure II, the graphs with the plants per pollinator are shown.

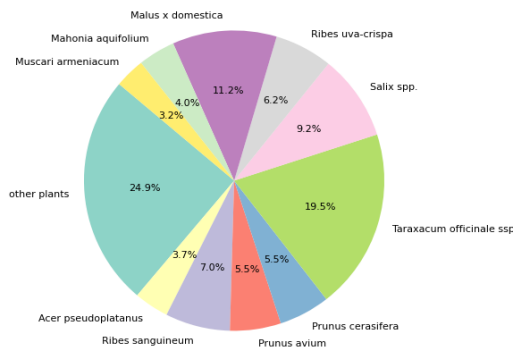
Plant preferences for honeybees in temperature range 4--12°C



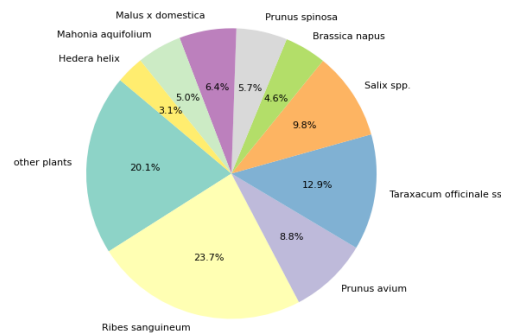
Plant preferences for bumblebees in temperature range 4--12°C



Plant preferences for wildbees in temperature range 4--12°C



Plant preferences for hoverflies in temperature range 4--12°C



Plant preferences for others in temperature range 4--12°C

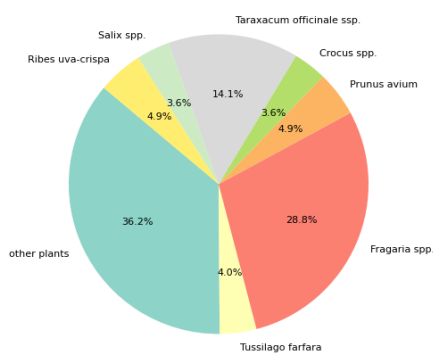
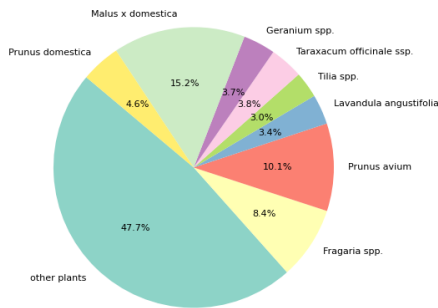


Figure II, plant preferences in the temperature range 4 to 12°C.

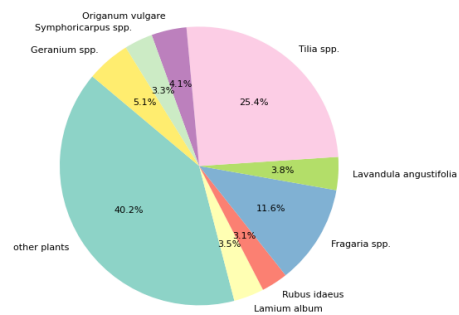
Temperature range 12 to 20 °C.

In the 12 to 20 °C range, *Malus x domestica*, *Prunus avium* and *Fragaria spp.* are the most preferred by the honey bee. The bumblebees preferred in this temperature range *Tilia spp.* and *Fragaria*, where the solitary bees preferred *Malus domestica*, *Geranium spp* and *Taraxacum spp.* The hoverflies prefer *Malus x domestica*, *Heracleum spp* and *Oreganum vulgare*. The other insects are mostly seen on *Fragaria spp.* In Figure III, the graphs with the plants per pollinator are shown.

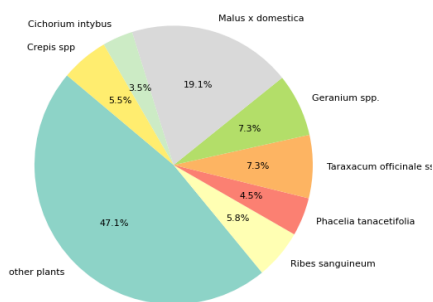
Plant preferences for honeybees in temperature range 12--20°C



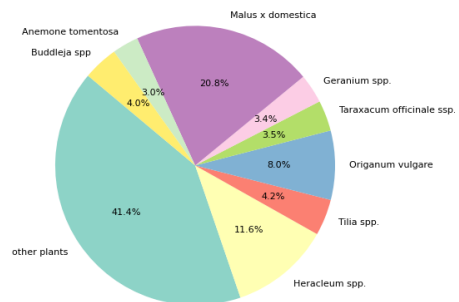
Plant preferences for bumblebees in temperature range 12--20°C



Plant preferences for wildbees in temperature range 12--20°C



Plant preferences for hoverflies in temperature range 12--20°C



Plant preferences for others in temperature range 12--20°C

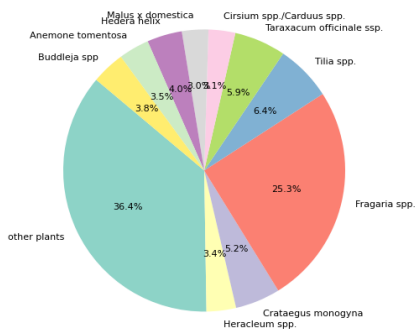
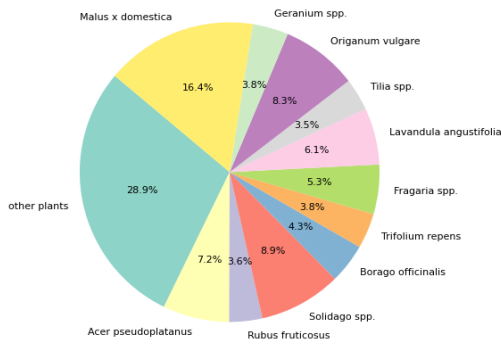


Figure III, plant preferences in the temperature range 12 to 20°C.

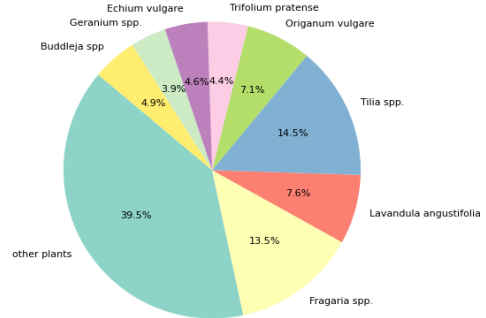
Temperature range 20 to 28 °C.

In the 20 to 28 °C range, many plant species are visited. *Malus x domestica* was preferred mostly by the honey bee. The bumblebees preferred in this temperature range *Fragaria spp* and *Tilia spp.*, where the solitary bees preferred *Malus x domestica*, *Heracleum spp* and *Solidago spp*. The hoverflies prefer *Heracleum spp.*, *Origanum vulgare*. *Malus x domestica* and *Buddleja spp*. The other insects are mostly seen on *Heracleum spp* and *Fragaria spp*. In Figure IV, the graphs with the plants per pollinator are shown.

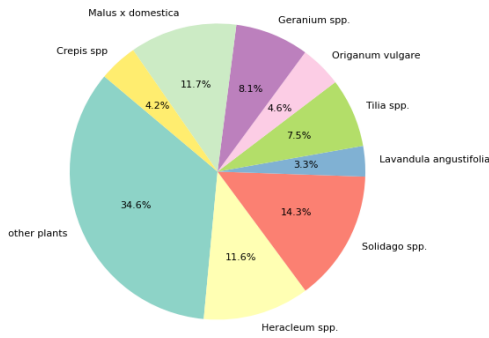
Plant preferences for honeybees in temperature range 20--28°C



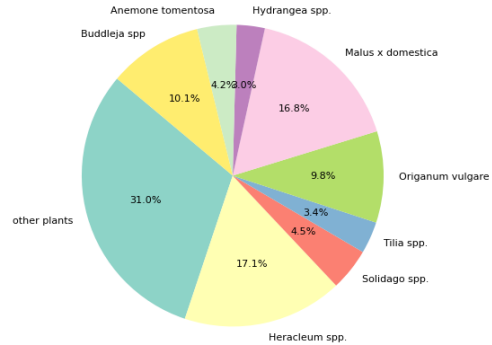
Plant preferences for bumblebees in temperature range 20--28°C



Plant preferences for wildbees in temperature range 20--28°C



Plant preferences for hoverflies in temperature range 20--28°C



Plant preferences for others in temperature range 20--28°C

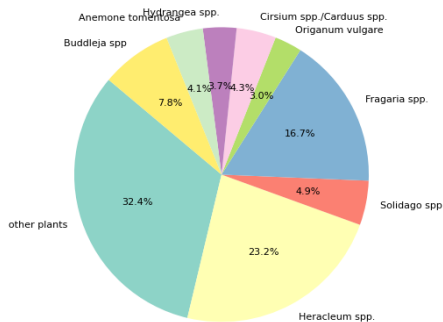


Figure IV, plant preferences in the temperature range 20 to 28 °C.

Temperature range 28 to 35 °C.

In the 28 to 35 °C range, the typical summer plant species are visited. *Solidago spp.*, *Lavendula angustifolia* and *Origanum vulgare* were preferred mostly by the honey bee. The bumblebees preferred in this temperature range *Echium vulgare*, *Trifolium pratense*, *Origanum vulgare* and *Lavendula angustifolia*, where the solitary bees preferred *Heracleum spp* and *Solidago spp.* The hoverflies preferred *Heracleum spp*, *Buddleja spp.* and *Origanum vulgare*. The other insects are mostly seen on *Heracleum spp* and *Solidago spp.* In Figure V, the graphs with the plants per pollinator are shown.

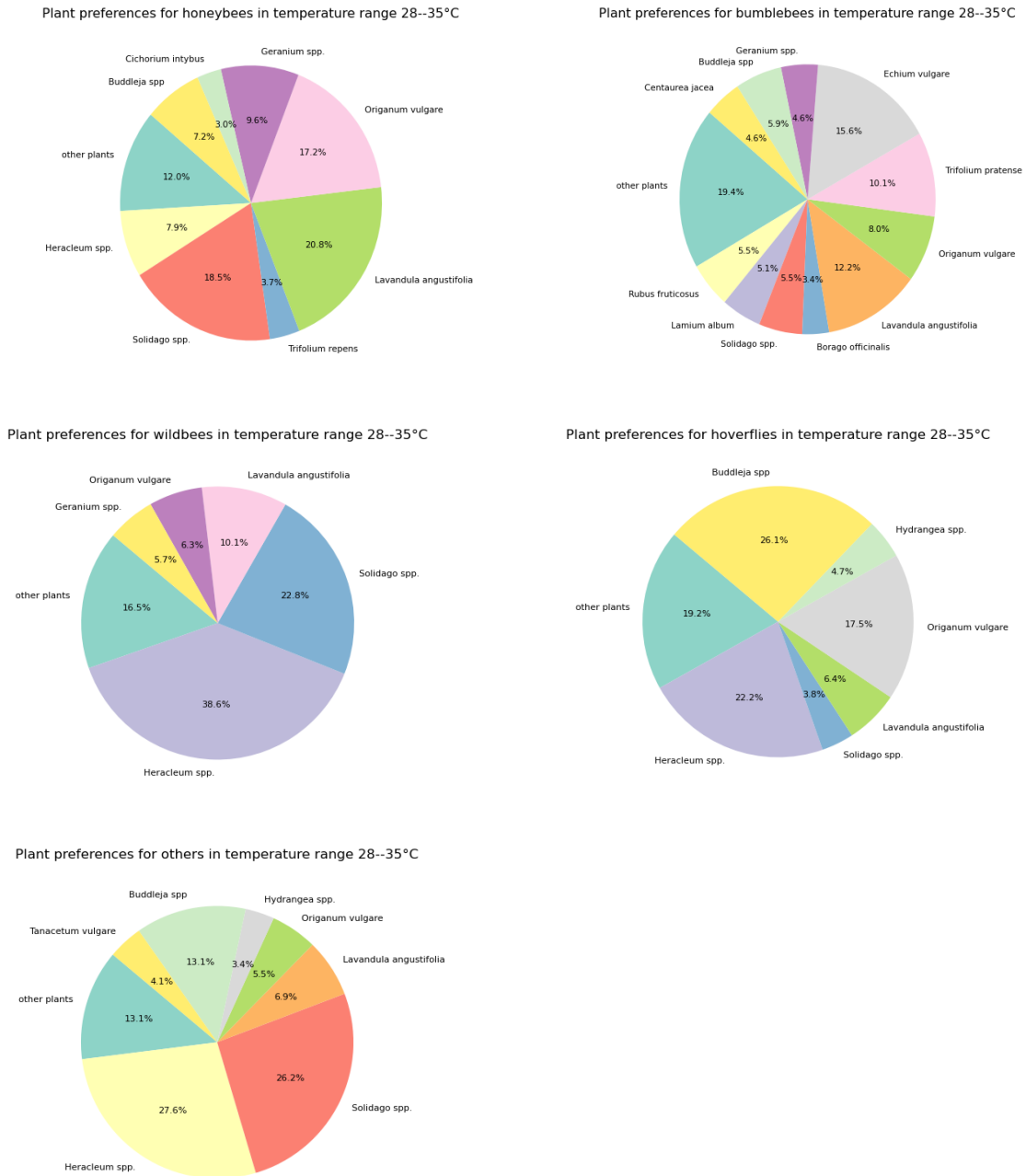


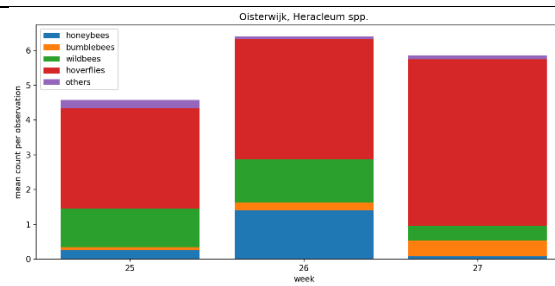
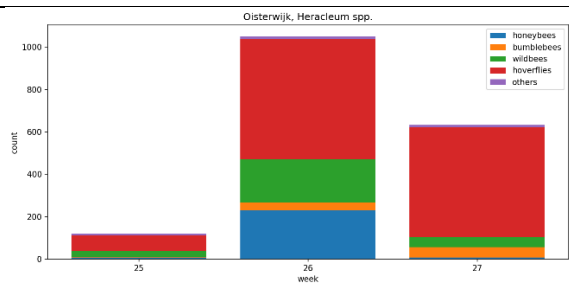
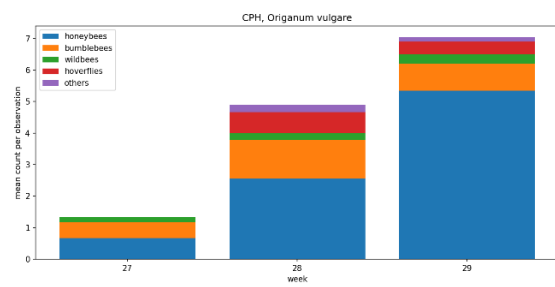
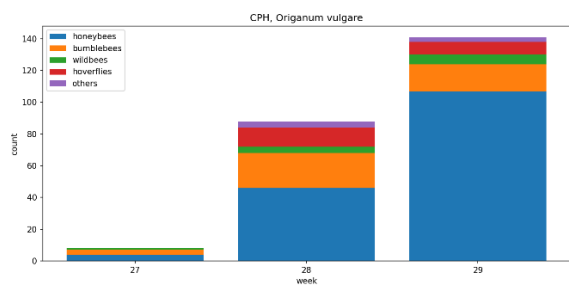
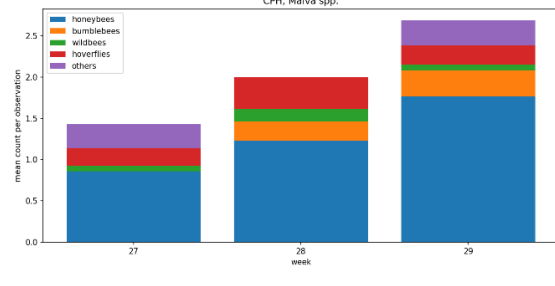
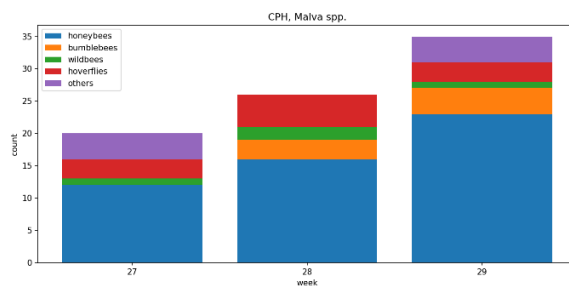
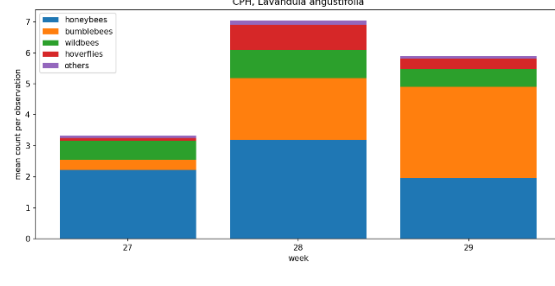
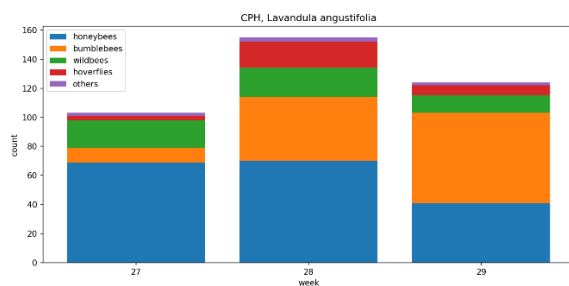
Figure V, plant preferences in the temperature range 28 to 35 °C.

Weekly totals and means of pollinating insects

The number of insects per week varies, depending on the number of observations, time of the day and weather conditions. In and around Copenhagen and Oisterwijk, the number of pollinating insects, both the week sum and weekly means for subsequent weeks, is presented in Figure VI. This contains the locations in an area with a radius of 33 to 35 km around Copenhagen and Oisterwijk. The radius is derived from 0.3 degree latitude and longitude, which corresponds to 33 to 35 km at the latitude of Oisterwijk, Copenhagen (CPH) and Vestby. Figure VI shows that the general patterns and ratios of pollinating insects are similar in the three subsequent weeks per location and different between the locations, indicating that the local conditions for pollinating insects, both for weather and housing conditions, differ between the locations.

Week total numbers of pollinators

Weekly means of pollinators



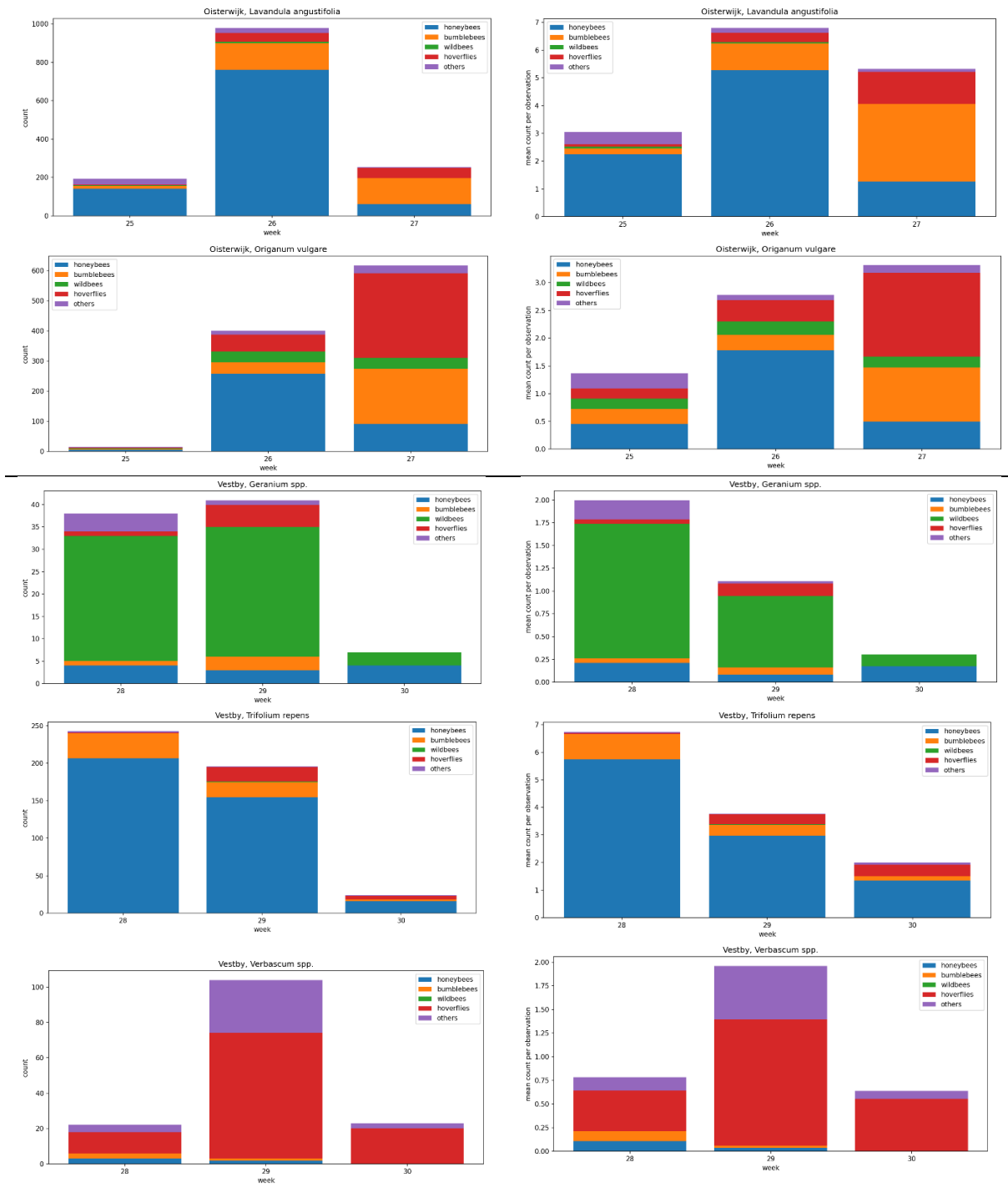


Figure VI. Pollinating insects in Copenhagen and Oisterwijk per week, presented as total per week and weekly means.

Dissimilarity Index: Bray-Curtis Index (BC) over 2 locations

To study whether observations of pollinating insects on specific flowers at two different locations show similarity in ratio of pollinating insects, the data from Oisterwijk (NL), Berkel Enschoot (NL), Arnhem (NL), Burkas pagasts (LV), Vestby (NO), Copenhagen (DK) and Vester vander (DK), were analysed for the Bray Curtis index (BC). A BC of 1 is completely dissimilar, and a BC of 0 is completely similar. The BC indices showed that there isn't much similarity in ratios of the pollinating insects on the same flowers at the various locations, both over the study period and week. This shows the value of lasting ongoing observations and locations.

The dissimilarity between the number of pollinating insects and locations is calculated with the Bray-Curtis dissimilarity index (BC). The recorded pollinating insects being honey bee; solitary bee; bumblebee; hoverfly, and other insects, e.g. butterfly. BC = 0 = similar number of the pollinating insects, and a similar ratio of the insects at the 2 locations over the observation period. BC = 1 = total dissimilar number of the pollinating insects, and the dissimilar ratio of the insects. The calculations are performed with the data from 2024 + 2025 from the locations Oisterwijk (NL), Berkel-Enschot (NL), Arnhem (NL), Burkas pagasts (LV), Vestby (NO), Copenhagen (DK), and Vester vander (DK). The number of observations per location and the pairwise comparisons are shown in maps 1 to 17 in the paragraph **Dissimilarity over 2 locations** in the attachment.

The indices are grouped and labelled in Table 3.

Table 3. Grouping and categorising BC indices

Bray-Curtis index (BC)	category
0 – 0.19	similar to almost similar
0.2 – 0.39	proximately similar
0.4 – 0.59	half similar
0.6 – 0.79	proximately dissimilar
0.8 - 1	almost entirely dissimilar

BC sorted by plants and locations.

The results are shown in Table 8 and in Figure VI. The data presented in Table 8 show that the BC indices sorted by plants vary from 0.234 to 0.975. As expected, none of the plants scored a BC index in the category “similar to almost similar”. Some plants show rather similar pollinating insects and ratios, and other plants show almost dissimilar insects and ratios. Amongst the proximately similar plants are *Anemone tomentose*, *Cirsium spp*, *Dasiphora fructose*, *Rosa spp* and *Trifolium repens*. Most of them have also BC indices in the “proximately similar” and “half similar” category, but none in the “proximately and “almost to entirely dissimilar” category. On the other hand, *Borago officinalis*, *Geranium spp*, *Lavendula angustifolia*, *Malus x domestica*, *Origanum vulgare* and *Scilla spp* are in the “almost to total dissimilar” category. In Figure VII, the data of the plants having sufficient recordings to calculate the BC index over 2 and 3 locations are presented. The differences as described above can clearly be seen, for example. In the pie graphs of *Anemone tomentosa* and *Borago officinalis*, *Cirsium spp* and *Lavendula angustifolia*, and *Cirsium spp* and *Malus x domestica*. In the paragraph **Pollinating insects on flowers**, the actual pollinating insects and the ratios are presented.

BC sorted by locations-pairs

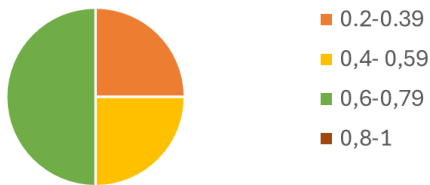
All paired locations show most BC indices in the categories half similar, proximality dissimilar and almost entirely dissimilar. The exception is the pair Vestby - Bunkas pagasts with BC indices in the proximality and half-similar category. The BC indices sorted by location-pairs having three or more BC indices are taken into account. The data from Oisterwijk (NL) and Berkel-Enschot (NL) are grouped as these locations are very close to each other.

Table 4. BC index sorted by the BC indices

Plant genera or species	Locations	BC index
<i>Lavendula angustifolia</i>	Bunkas pagasts (Latvia) – Copenhagen (DK)	0.234
<i>Crepis spp</i>	Oisterwijk (NL) – Arnhem (NL)	0.267
<i>Rosa spp</i>	Berkel-Enschot (NL) – Copenhagen (DK)	0.275
<i>Trifolium repens</i>	Bunkas pagasts (LV) – Vestby (NO)	0.280
<i>Cirsium spp / Carduus spp</i>	Berkel – Enschoot (NI) – Copenhagen (DK)	0.333
<i>Rosa spp</i>	Oisterwijk (NL) – Copenhagen (DK)	0.345
<i>Rosa spp</i>	Berkel-Enschot (NL) – Bunkas pagasts (LV)	0.356
<i>Rosa spp</i>	Copenhagen (DK) – Bunkas pagasts (LV)	0.396
<i>Dasiphora fructosa</i>	Bunkas pagasts (Latvia) - Vestby (NO)	0.447
<i>Rosa spp</i>	Oisterwijk (NL) – Bunkas pagasts (LV)	0.450
<i>Anemone tomentosa</i>	Bunkas pagasts (LV) – Vestby (NO)	0.461
<i>Hydrangea spp</i>	Bunkas pagasts (Latvia) – Oisterwijk (NL)	0.473
<i>Cirsium spp / Carduus spp</i>	Oisterwijk (NI) – Copenhagen (DK)	0.475
<i>Anemone tomentosa</i>	Oisterwijk (NI) – Vestby (NO)	0.481
<i>Geranium spp</i>	Berkel-Enschot (NL) – Copenhagen (DK)	0.492
<i>Origanum vulgare</i>	Copenhagen (DK) – Vestby (NO)	0.492
<i>Borago officinalis</i>	Copenhagen (DK) - Oisterwijk (NI)	0.517
<i>Symphytum spp</i>	Bunkas pagasts (LV) – Oisterwijk (NL)	0.519
<i>Origanum vulgare</i>	Oisterwijk (NL) – Vestby (NO)	0.562
<i>Lavendula angustifolia</i>	Berkel-Enschot (NL) - Bunkas pagasts (Latvia)	0.613
<i>Geranium spp</i>	Oisterwijk (NL) – Copenhagen (DK)	0.627
<i>Anemone tomentosa</i>	Berkel-Enschot (NI) – Bunkas pagasts (Latvia)	0.643
<i>Malus x domestica</i>	Copenhagen (DK) – Vester Vander (DK)	0.680
<i>Lavendula angustifolia</i>	Oisterwijk (NL) - Bunkas pagasts (Latvia)	0.683
<i>Hydrangea spp</i>	Bunkas pagasts (Latvia) - Berkel-Enschot (NL)	0.705
<i>Anemone tomentosa</i>	Oisterwijk (NI) - Bunkas pagasts (Latvia)	0.708
<i>Symphoricarpus spp</i>	Copenhagen (DK) – Vestby (NO)	0.716
<i>Taraxacum officinale</i>	Copenhagen (DK) – Vestby (NO)	0.724
<i>Geranium spp</i>	Copenhagen (DK) – Vestby (NO)	0.729
<i>Lavendula angustifolia</i>	Oisterwijk (NL) – Copenhagen (DK)	0.749
<i>Trifolium repens</i>	Vestby (N)) – Oisterwijk (NL)	0.773
<i>Crataegus monogyna</i>	Copenhagen (DK) – Vester Vandet (DK)	0.795
<i>Trifolium repens</i>	Bunkas pagasts (LV) – Oisterwijk (NL)	0.799
<i>Lavendula angustifolia</i>	Berkel-Enschot (NL) – Copenhagen (DK)	0.804
<i>Origanum vulgare</i>	Oisterwijk (NL) – Copenhagen (DK)	0.818
<i>Geranium spp</i>	Oisterwijk (NL) – Vestby (NO)	0.833

<i>Scilla spp</i>	Copenhagen (DK) – Vestby (NO)	0.836
<i>Borago officinalis</i>	Bunkas pagasts (Latvia) – Copenhagen (DK) (NI)	0.847
<i>Borago officinalis</i>	Bunkas pagasts (Latvia) - Oisterwijk (NI)	0.947
<i>Malus x domestica</i>	Copenhagen (DK) – Vestby (NO)	0.971
<i>Malus x domestica</i>	Vester Vander (DK) - Vestby (NO)	0.975

BC indices over 2 locations of *Anemone tomentosa*



BC indices over 2 locations of *Borago officinalis*



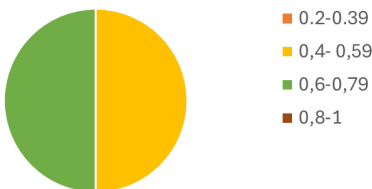
BC indices over 2 locations of *Cirsium spp / Carduus spp*



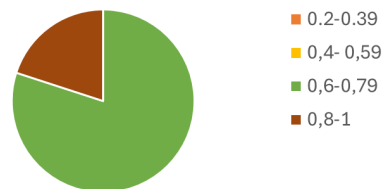
BC indices over 2 locations of *Geranium spp*



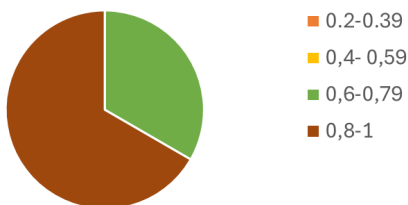
BC indices over 2 locations of *Hydrangea spp*



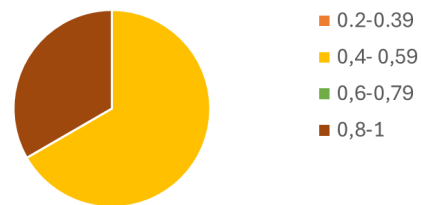
BC indices over 2 locations of *Lavendula angustifolia*



BC indices over 2 locations of *Malus x domestica*



BC indices over 2 locations of *Origanum vulgare*



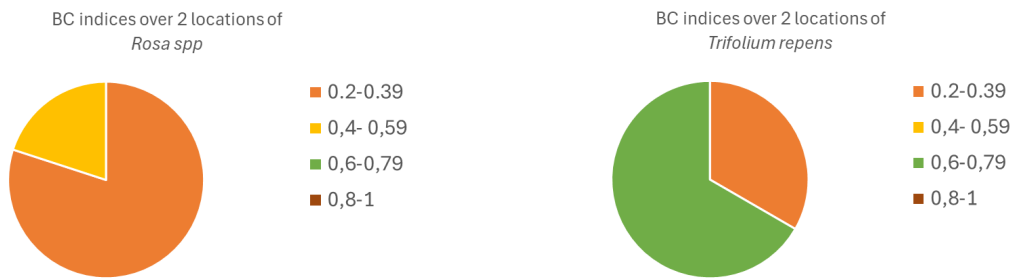


Figure VII. The Bray Curtis indices over 2 locations per plant grouped per category BC = 0-0.9; 0.2-0.39; 0.4-0.59; 0.6-0.79 and 0.8-1

The plants having the BC index category similar to almost similar: *Anemone tomentose*, *Cirsium spp*, *Dasiphora fructose*, *Rosa spp* and *Trifolium repens*, the pollinating insect ratios are presented in Table 5. It must be noted that the same plants show a higher dissimilarity at other locations, showing the regional differences.

BC sorted by plants, two locations and week.

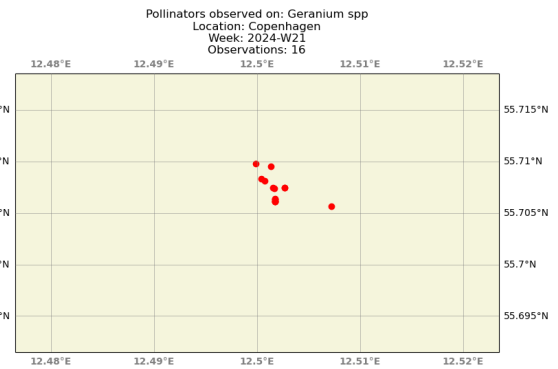
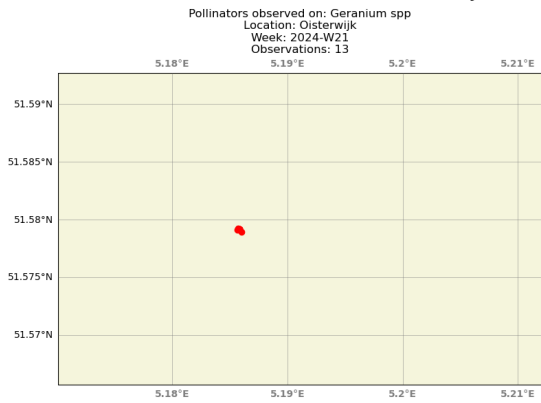
Of the plants, *Geranium spp*, *Lavendula angustifolia*, *Origanum vulgare* and *Taraxacum officinale*, the BC indices were calculated per week over two locations. In Table 5, the data are presented. In Figure VII, the maps are shown, including the number of observations.

Table 5. BC indices of *Geranium spp*, *Lavendula angustifolia*, *Origanum vulgare* and *Taraxacum officinale* by week over the locations Oisterwijk and Copenhagen.

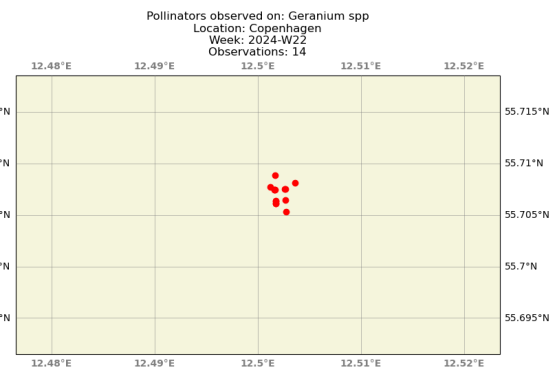
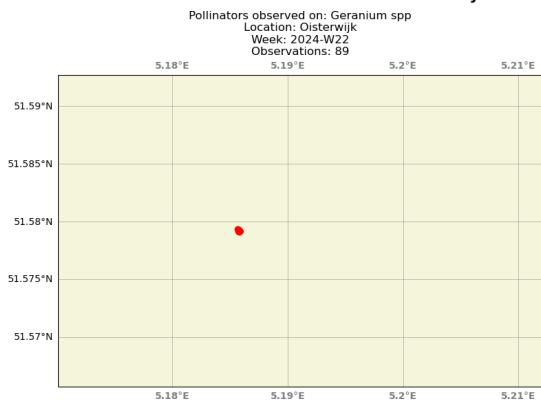
week	plant	Location	location	BC index
2024, wk 21	<i>Geranium spp</i>	Oisterwijk	Copenhagen	0.795
2024, wk 22	<i>Geranium spp</i>	Oisterwijk	Copenhagen	0.762
2024, wk 24	<i>Geranium spp</i>	Oisterwijk	Copenhagen	0.596
2025, wk 23	<i>Geranium spp</i>	Oisterwijk	Copenhagen	0.711
2024, wk 27	<i>Lavendula angustifolia</i>	Oisterwijk	Copenhagen	0.692
2024, wk 28	<i>Lavendula angustifolia</i>	Oisterwijk	Copenhagen	0.538
2024, wk 29	<i>Lavendula angustifolia</i>	Oisterwijk	Copenhagen	0.520
2024, wk 29	<i>Origanum vulgare</i>	Oisterwijk	Copenhagen	0.585
2025, wk 17	<i>Taraxacum officinale</i>	Oisterwijk	Copenhagen	0.585

The BC indices for *Geranium spp* and *Lavendula angustifolia* vary from half similar to proximately dissimilar, showing a different ratio of pollinators at the two locations.

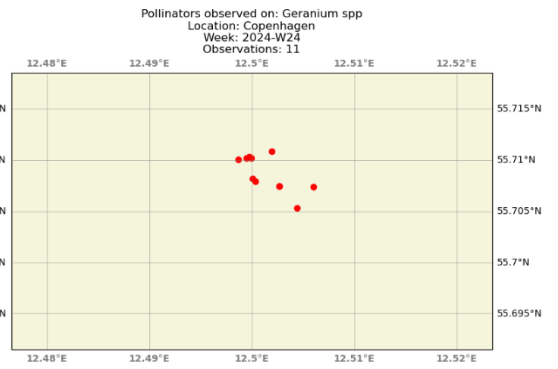
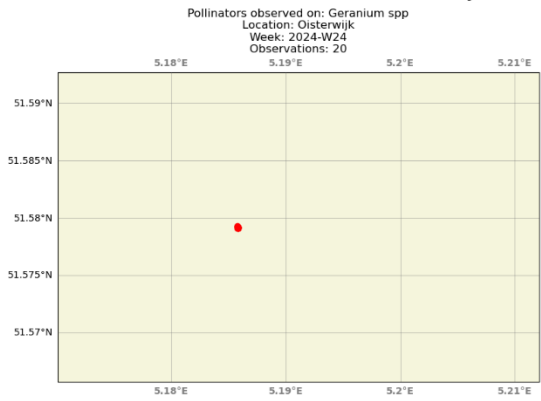
Bray Curtis dissimilarity: 0.795



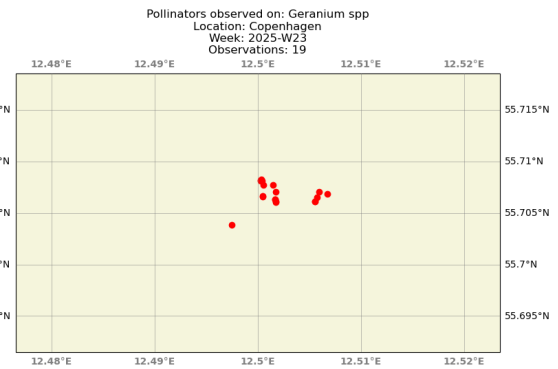
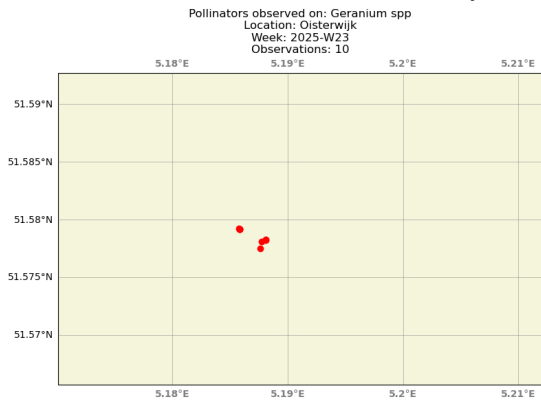
Bray Curtis dissimilarity: 0.762



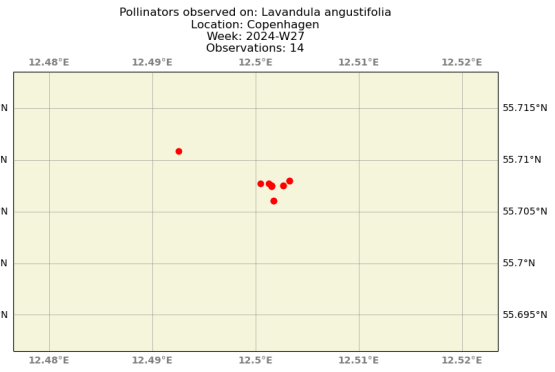
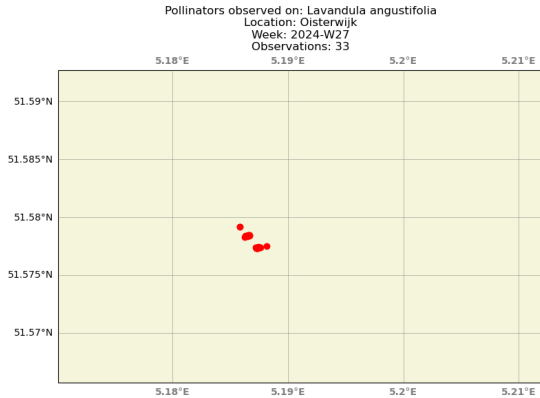
Bray Curtis dissimilarity: 0.596



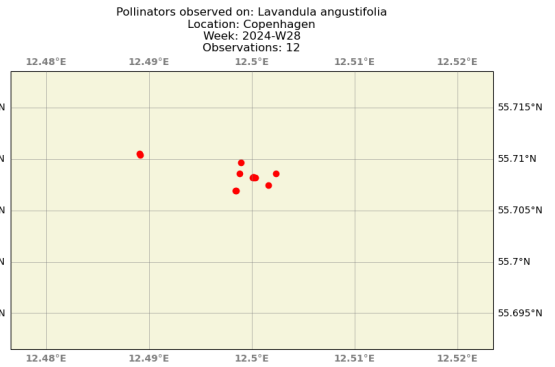
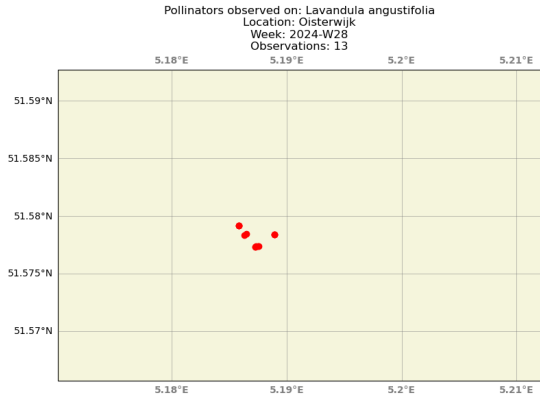
Bray Curtis dissimilarity: 0.711



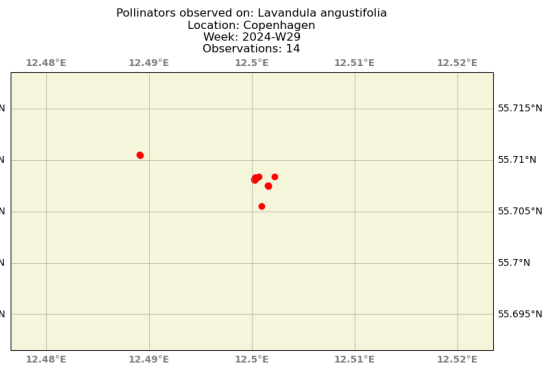
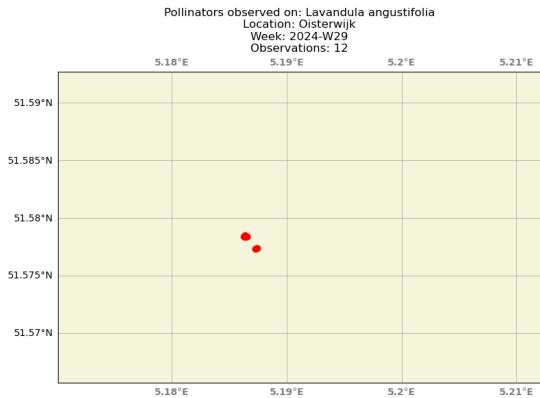
Bray Curtis dissimilarity: 0.692



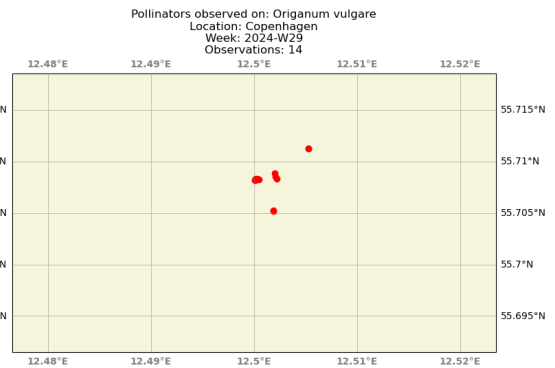
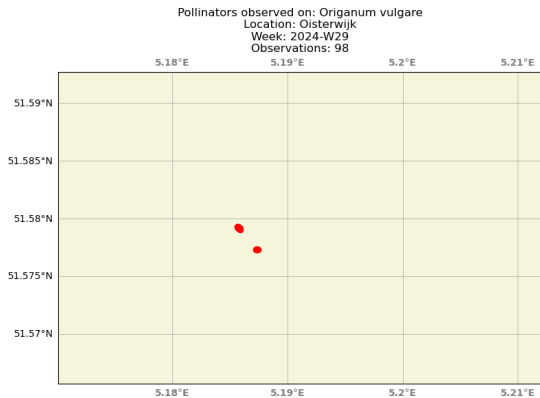
Bray Curtis dissimilarity: 0.538



Bray Curtis dissimilarity: 0.520



Bray Curtis dissimilarity: 0.585



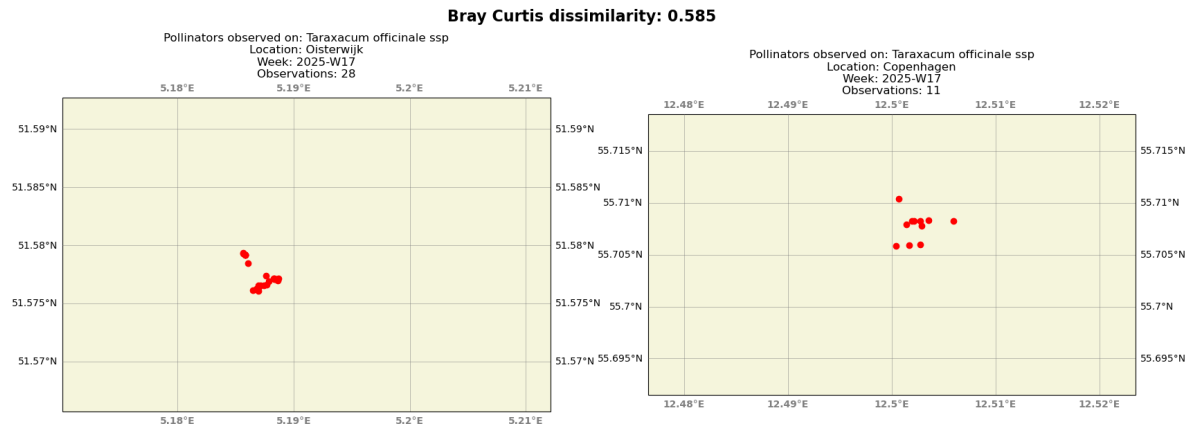


Figure VIII. Bray-Curtis indices of *Geranium* spp, *Lavendula angustifolia*, *Origanum* spp and *Taraxacum vulgare* by week between Oisterwijk and Copenhagen

Attachment

Number of observations sorted by plants.

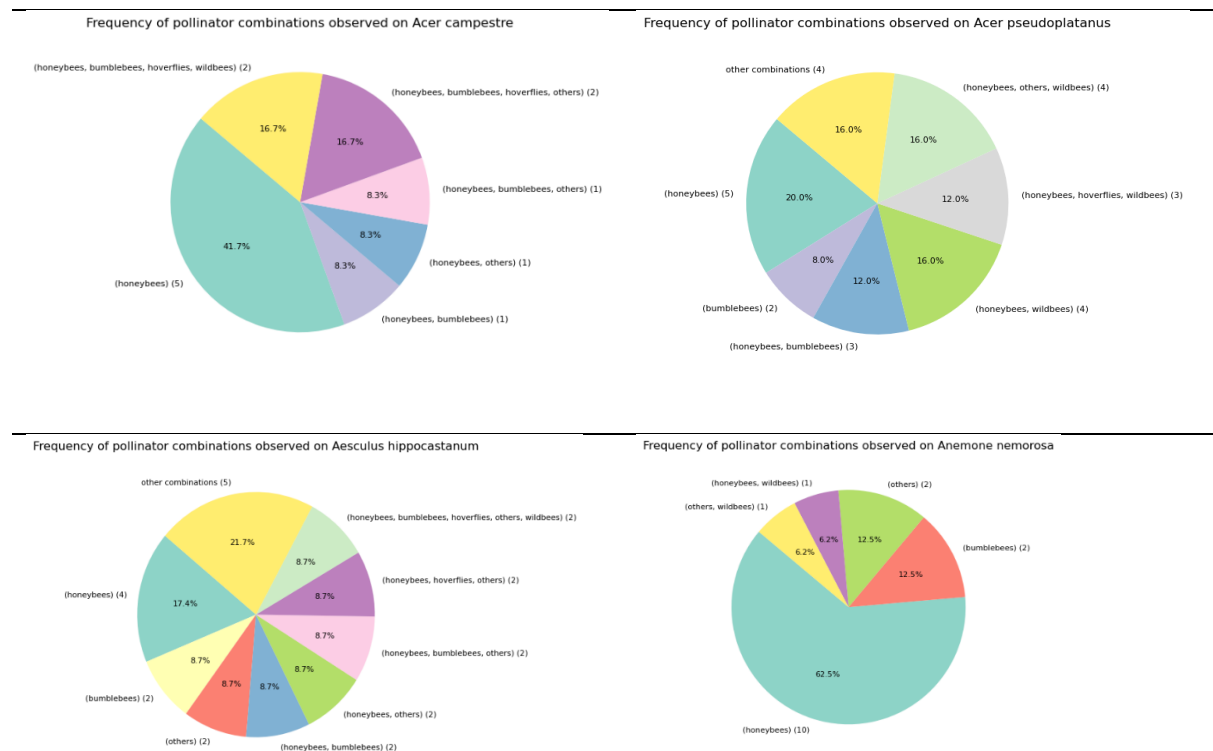
Table 6. number of observations per plant

plant	number observations	plant	number observations
<i>Origanum vulgare</i>	541	<i>Trifolium hybridum</i>	41
<i>Geranium spp</i>	498	<i>Nepata spp</i>	40
<i>Buddleja spp</i>	258	<i>Salix spp</i>	39
<i>Lavendula angustifolia</i>	253	<i>Filipendula ulmaria</i>	38
<i>Echium vulgare</i>	236	<i>Cichorium intybus</i>	33
<i>Heracleum spp</i>	222	<i>Mahonia aquifolium</i>	32
<i>Rosa spp</i>	187	<i>Hypochaeris radicata</i>	31
<i>Lamium album</i>	156	<i>Salvia spp</i>	31
<i>Borago officinalis</i>	139	<i>Symphytum spp</i>	29
<i>Hydrangea spp</i>	134	<i>Tilia spp</i>	29
<i>Trifolium repens</i>	127	<i>Muscaria armeniacum</i>	27
<i>Symphoricarpus spp</i>	114	<i>Plantago spp</i>	27
<i>Cirsium spp - Carduus spp</i>	108	<i>Pyrus communis</i>	26
<i>Anemone tomentosa</i>	104	<i>Melilotus alba</i>	25
<i>Crepis spp</i>	93	<i>Prunus domestica</i>	25
<i>Lythrus salicaria</i>	86	<i>Aesculus hippocastanum</i>	23
<i>Ligustrum vulgare</i>	85	<i>Acer pseudopiantaoides</i>	21
<i>Phacelia tnacetifolia</i>	85	<i>Vicia faba</i>	21
<i>Rubus idaeus</i>	82	<i>Fragaria spp</i>	19
<i>Taraxacum officinale spp</i>	80	<i>Verbascum spp</i>	19
<i>Knautia arvensis</i>	77	<i>Cotoneaster spp</i>	18
<i>Papaver spp</i>	72	<i>Sorbus aucuparia</i>	18
<i>Malus x domestica</i>	71	<i>Centaure cyanus</i>	17
<i>Dasiphora fruticosa</i>	67	<i>Robinia pseudoacacia</i>	17
<i>Eupatorium cannabinum</i>	66	<i>Tussilago farfara</i>	17
<i>Rubus fruticosus</i>	63	<i>Anemone nemorosa</i>	16

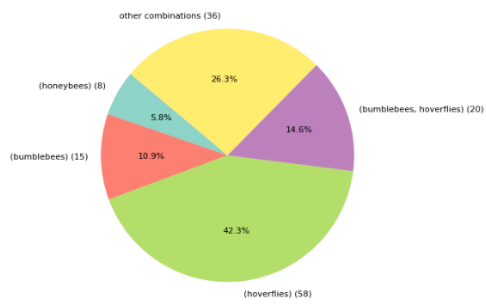
<i>Rubus spp</i>	60	<i>Clematis vitalba</i>	14
<i>Trifolium pratense</i>	59	<i>Fagopyrum esculentum</i>	14
<i>Solidago spp</i>	54	<i>Ribes uva-crispa</i>	14
<i>Centaurea scabiosa</i>	53	<i>Prunus spinosa</i>	13
<i>Chamerion angustifolium</i>	52	<i>Scilla spp</i>	13
<i>Prunus avium</i>	51	<i>Acer campestre</i>	12
<i>Epilobium spp</i>	46	<i>Lamium purpureum</i>	12
<i>Malva spp</i>	45	<i>Prunus cerasifera</i>	12
<i>Crataegus monogyna</i>	42	<i>Thymus vulgaris</i>	12
		<i>Brassica napus</i>	11

A combination of pollinating insects on plants

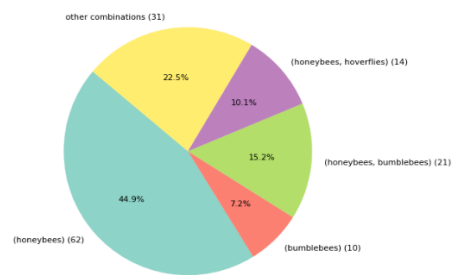
Figure IX presents the sole and combined recorded visits of pollinating insects to plants during the study period of April 2024 to 17 August 2025. The percentages are calculated with the number of observations presented in brackets after each insect and combination. The Figures presented are the plants that met the threshold of > 10 observations, regardless of the location, during the study period.



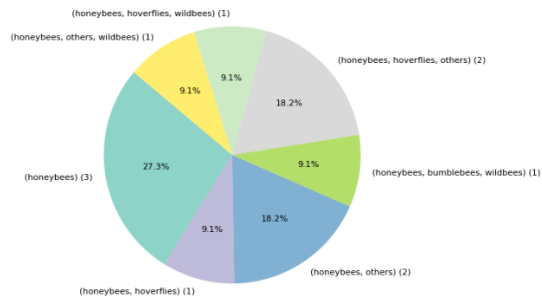
Frequency of pollinator combinations observed on *Anemone tomentosa*



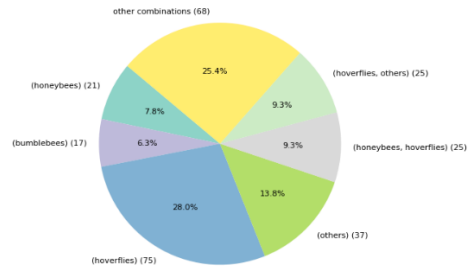
Frequency of pollinator combinations observed on *Borago officinalis*



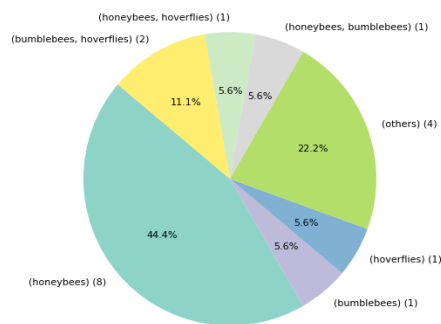
Frequency of pollinator combinations observed on *Brassica napus*



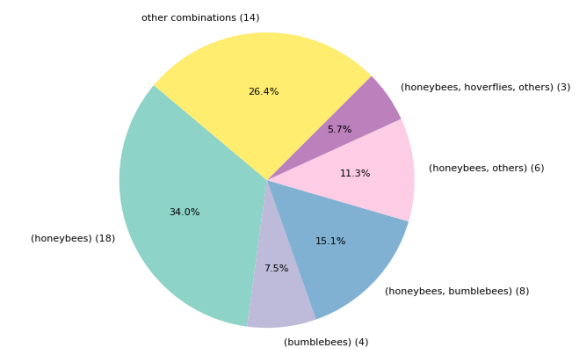
Frequency of pollinator combinations observed on *Buddleja* spp



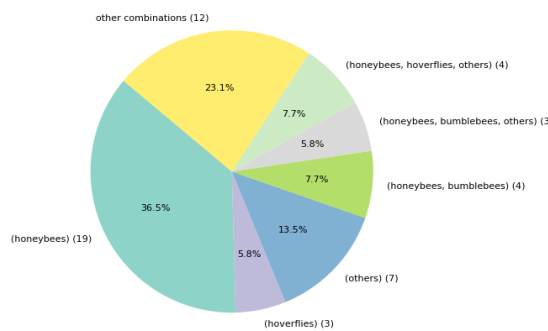
Frequency of pollinator combinations observed on *Centaurea cyanus*



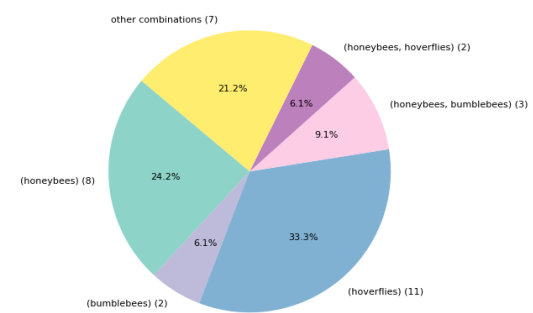
Frequency of pollinator combinations observed on *Centaurea scabiosa*



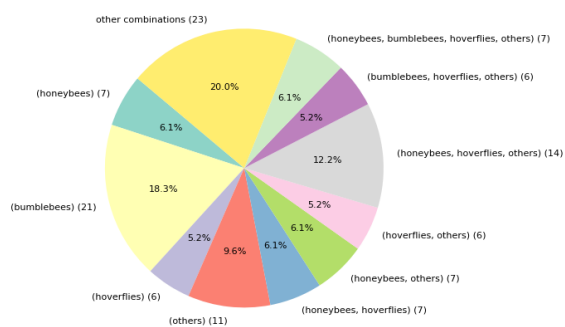
Frequency of pollinator combinations observed on *Chamerion angustifolium*



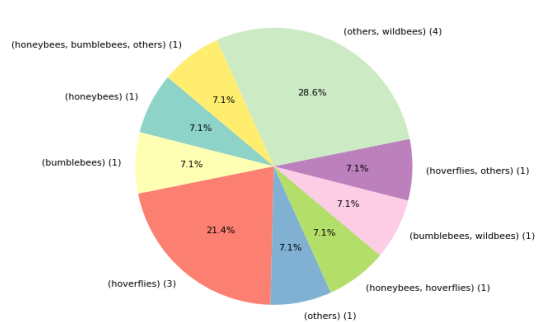
Frequency of pollinator combinations observed on *Cichorium intybus*



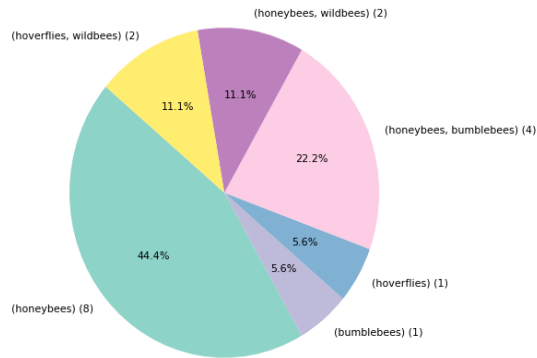
Frequency of pollinator combinations observed on *Cirsium spp-Carduus spp*



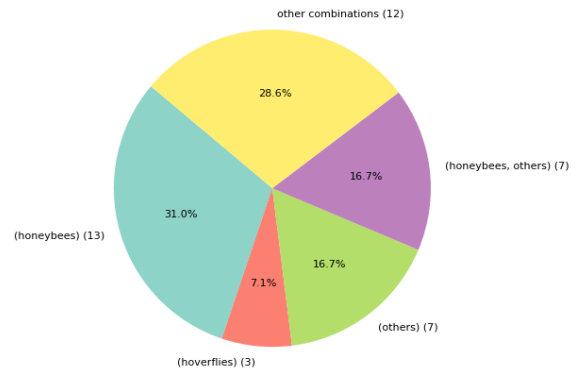
Frequency of pollinator combinations observed on *Clematis vitalba*



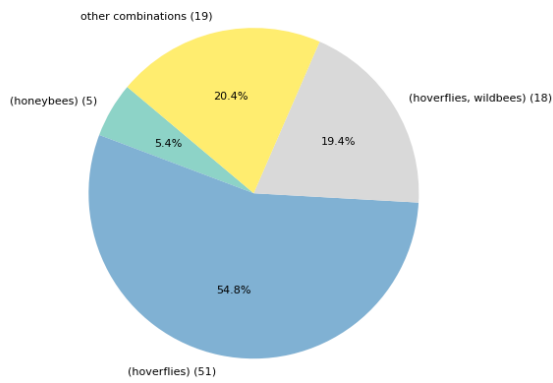
Frequency of pollinator combinations observed on *Cotoneaster* spp



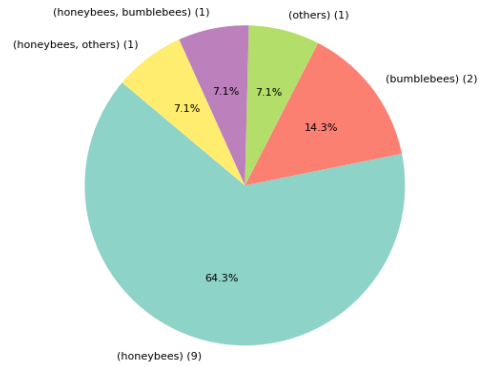
Frequency of pollinator combinations observed on *Crataegus monogyna*



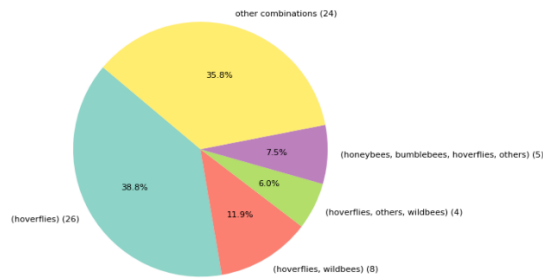
Frequency of pollinator combinations observed on *Crepis* spp



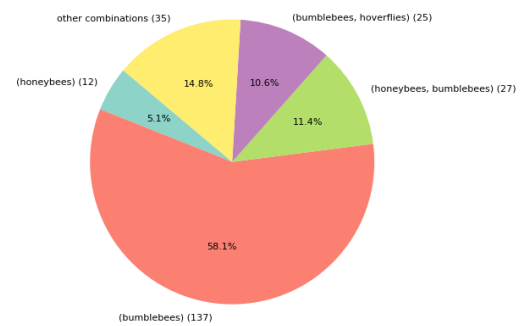
Frequency of pollinator combinations observed on *Crocus* spp



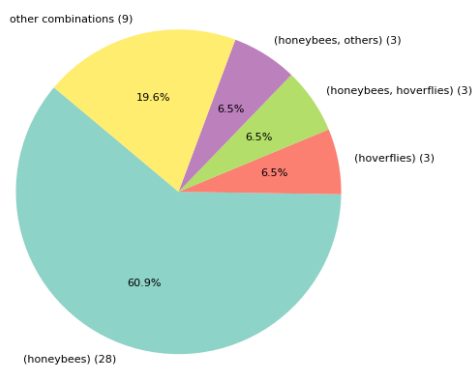
Frequency of pollinator combinations observed on *Dasiphora fruticosa*



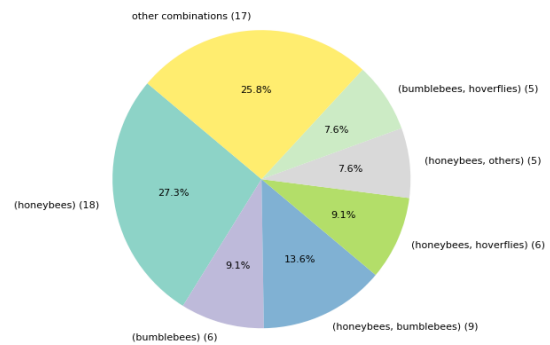
Frequency of pollinator combinations observed on *Echium vulgare*



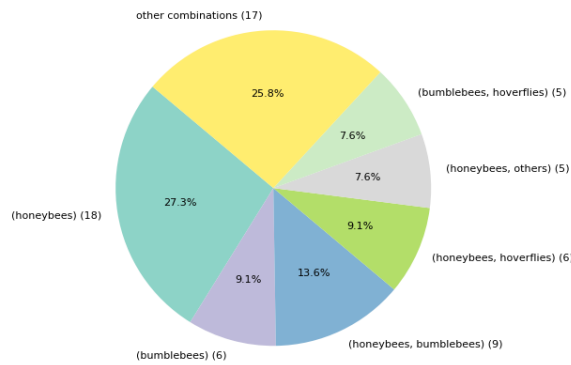
Frequency of pollinator combinations observed on *Epilobium* spp



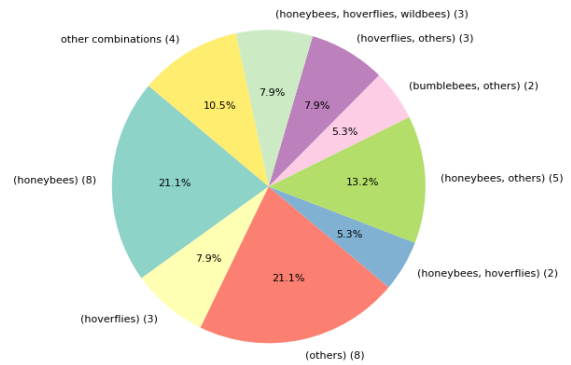
Frequency of pollinator combinations observed on *Eupatorium cannabinum*



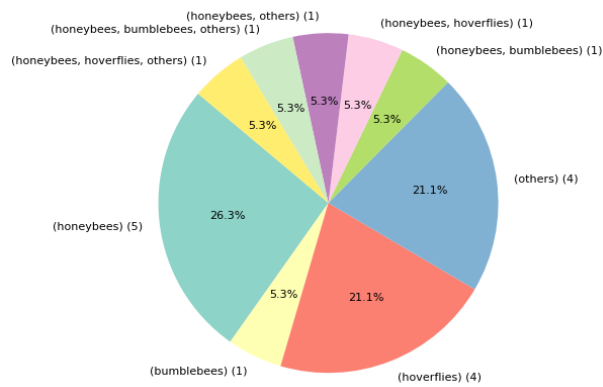
Frequency of pollinator combinations observed on *Eupatorium cannabinum*



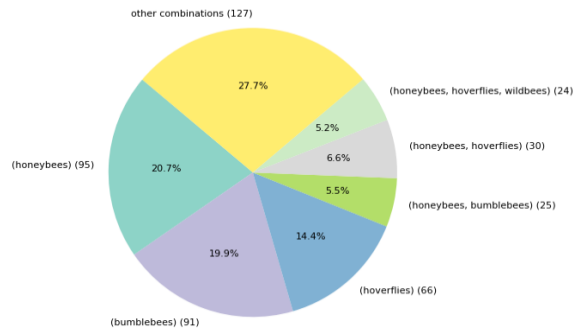
Frequency of pollinator combinations observed on *Filipendula ulmaria*



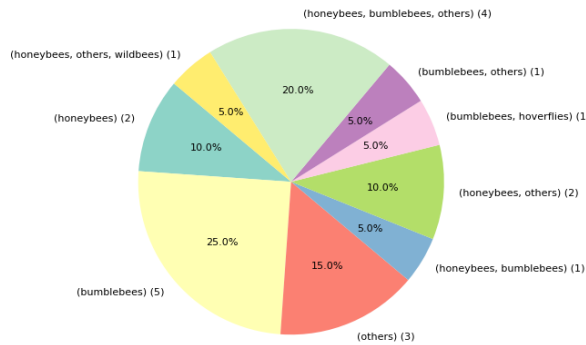
Frequency of pollinator combinations observed on *Fragaria* spp



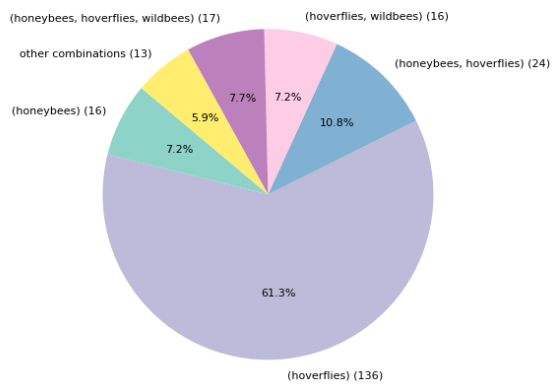
Frequency of pollinator combinations observed on *Geranium* spp



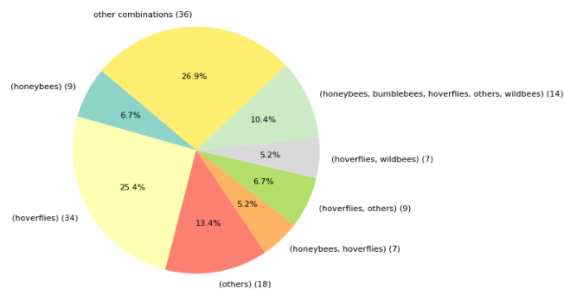
Frequency of pollinator combinations observed on *Helianthus annuus*



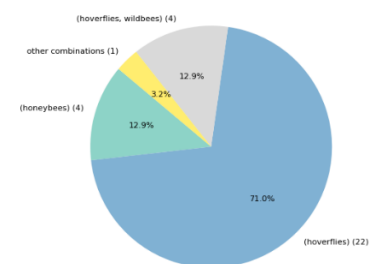
Frequency of pollinator combinations observed on *Heracleum* spp



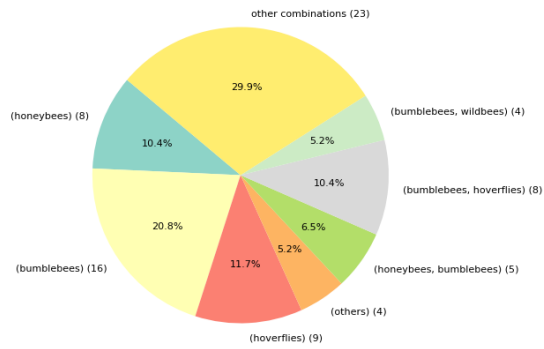
Frequency of pollinator combinations observed on *Hydrangea* spp



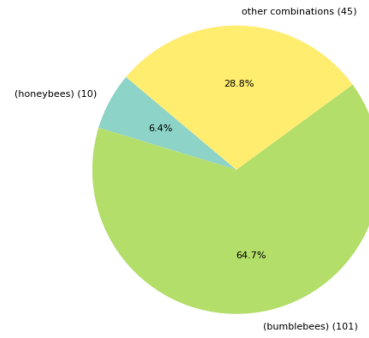
Frequency of pollinator combinations observed on *Hypochaeris radicata*



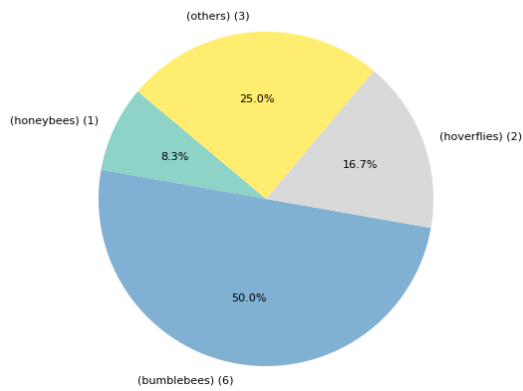
Frequency of pollinator combinations observed on *Knautia arvensis*



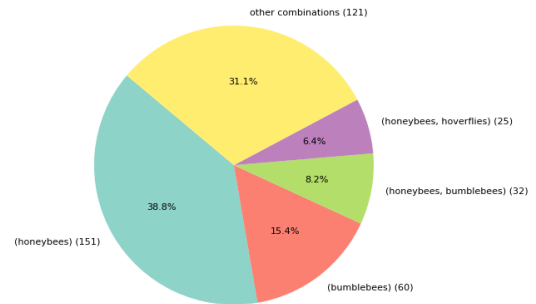
Frequency of pollinator combinations observed on *Lamium album*



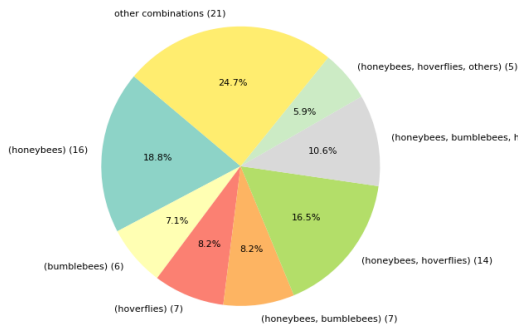
Frequency of pollinator combinations observed on *Lamium purpureum*



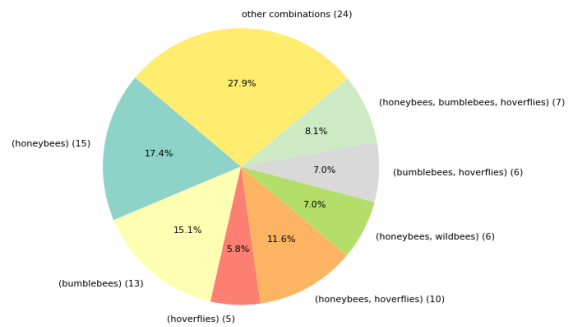
Frequency of pollinator combinations observed on *Lavandula angustifolia*



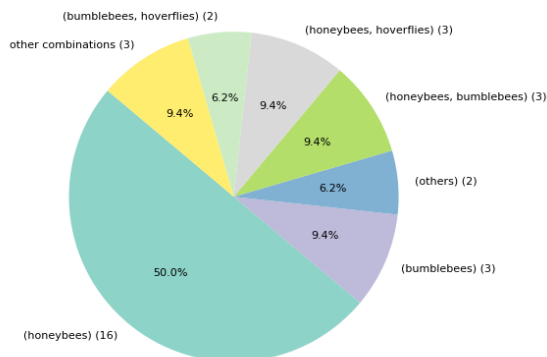
Frequency of pollinator combinations observed on *Ligustrum vulgare*



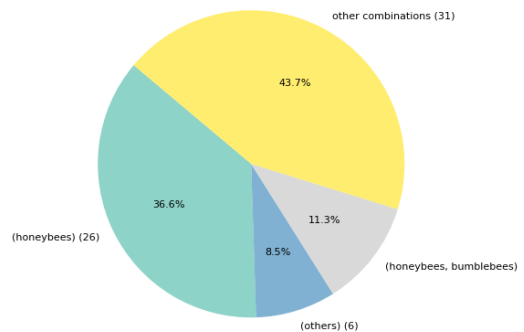
Frequency of pollinator combinations observed on *Lythrum salicaria*



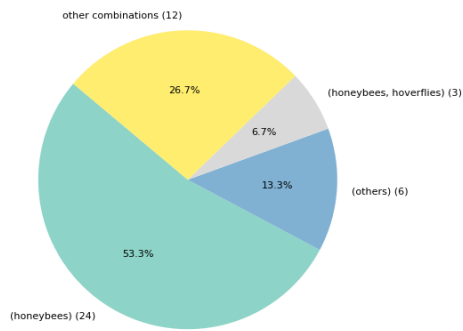
Frequency of pollinator combinations observed on *Mahonia aquifolium*



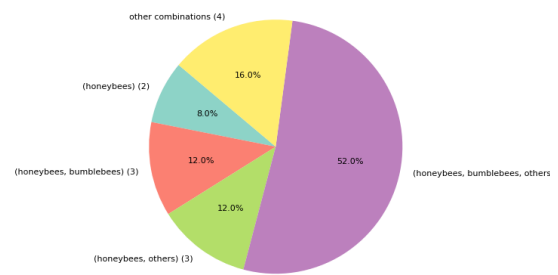
Frequency of pollinator combinations observed on *Malus x domestica*



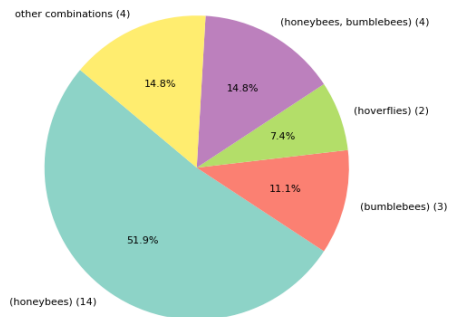
Frequency of pollinator combinations observed on *Malva* spp



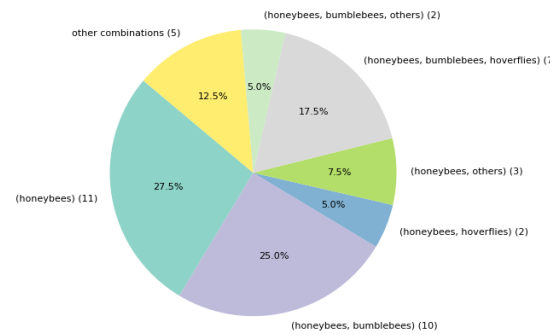
Frequency of pollinator combinations observed on *Melilotus alba*



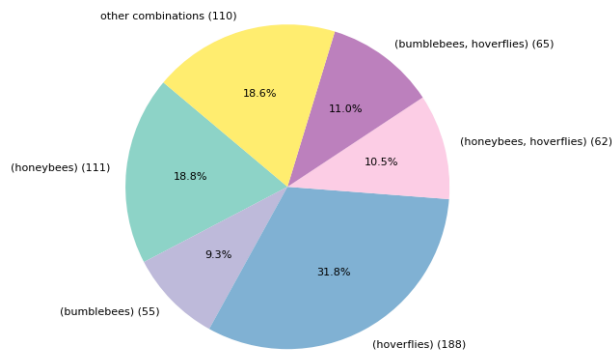
Frequency of pollinator combinations observed on *Muscari armeniacum*



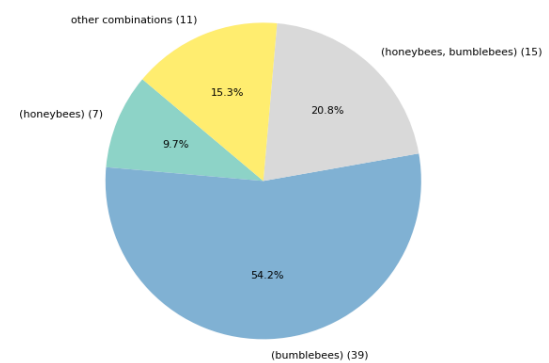
Frequency of pollinator combinations observed on *Nepeta* spp



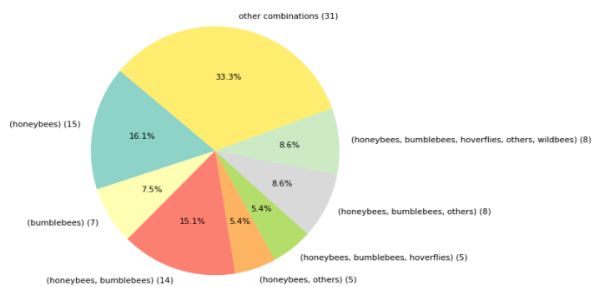
Frequency of pollinator combinations observed on *Origanum vulgare*



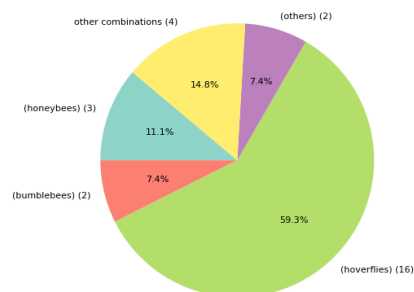
Frequency of pollinator combinations observed on *Papaver* spp



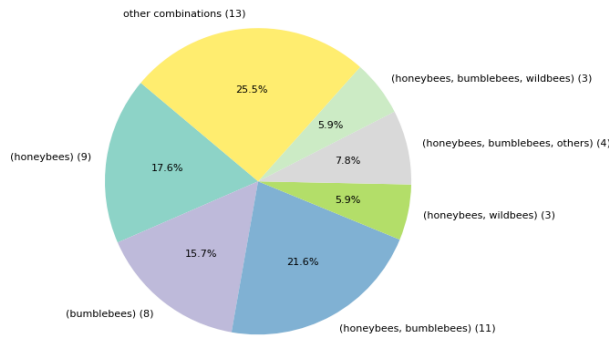
Frequency of pollinator combinations observed on *Phacelia tanacetifolia*



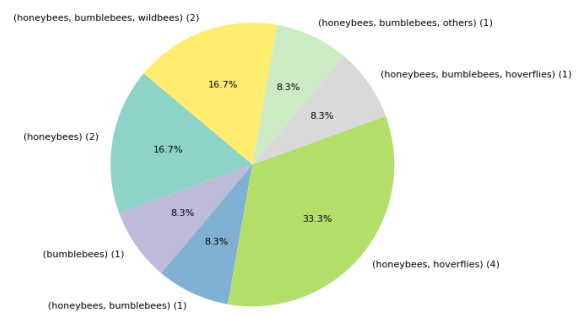
Frequency of pollinator combinations observed on *Plantago* spp



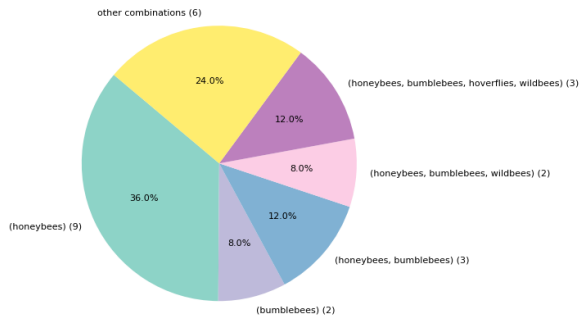
Frequency of pollinator combinations observed on *Prunus avium*



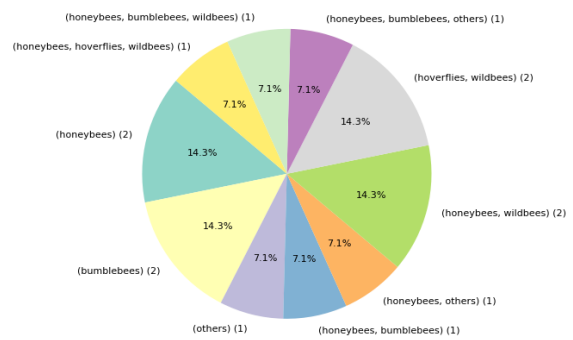
Frequency of pollinator combinations observed on *Prunus cerasifera*



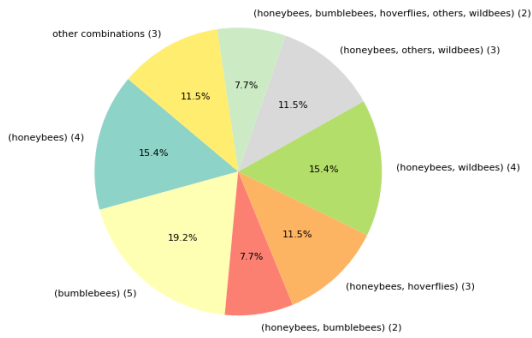
Frequency of pollinator combinations observed on *Prunus domestica*



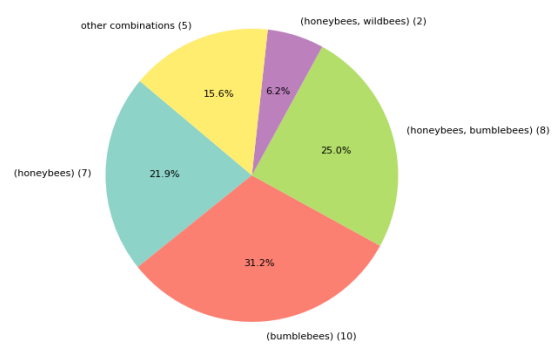
Frequency of pollinator combinations observed on *Prunus spinosa*



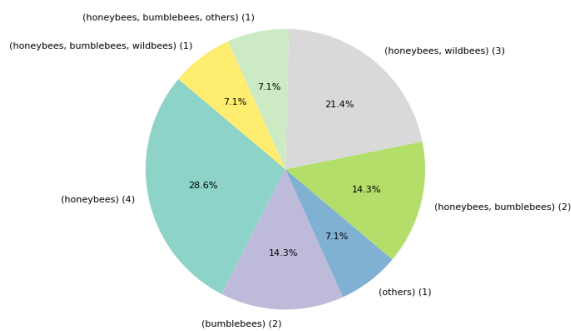
Frequency of pollinator combinations observed on *Pyrus communis*



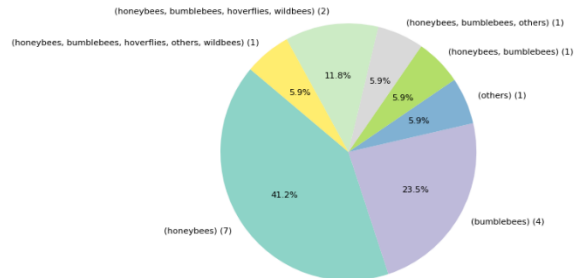
Frequency of pollinator combinations observed on *Ribes sanguineum*



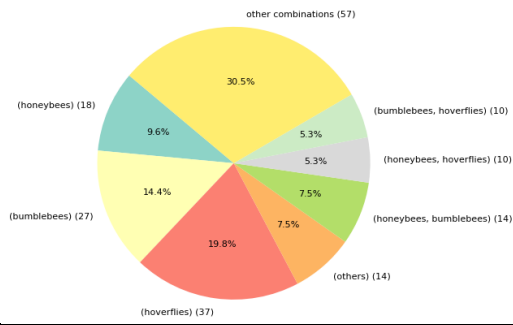
Frequency of pollinator combinations observed on *Ribes uva-crispa*



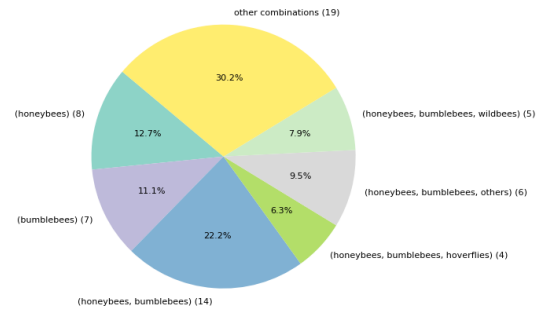
Frequency of pollinator combinations observed on *Robinia pseudoacacia*



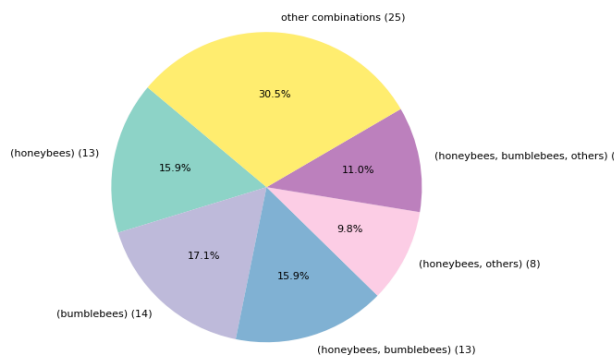
Frequency of pollinator combinations observed on *Rosa* spp



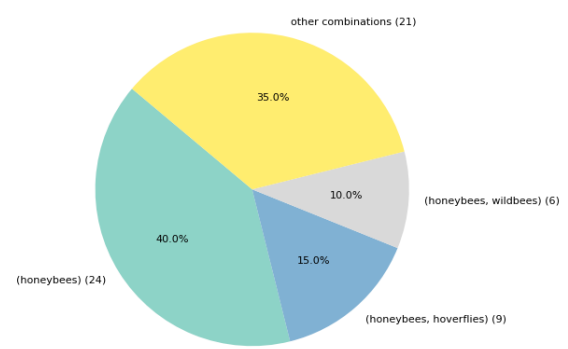
Frequency of pollinator combinations observed on *Rubus fruticosus*



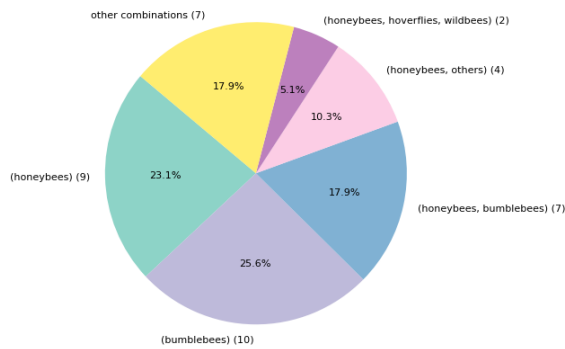
Frequency of pollinator combinations observed on *Rubus idaeus*



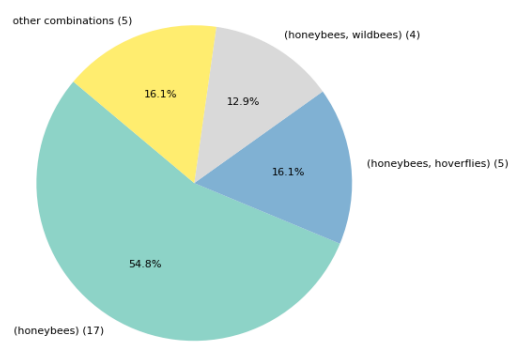
Frequency of pollinator combinations observed on *Rubus* spp



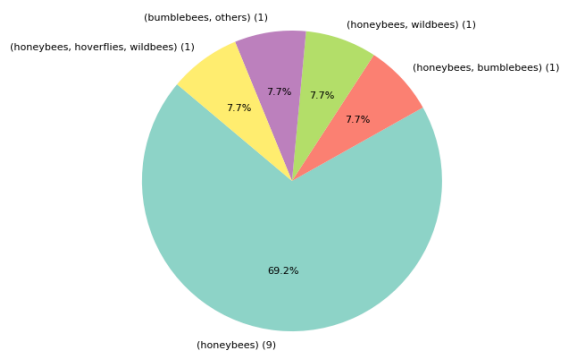
Frequency of pollinator combinations observed on *Salix* spp



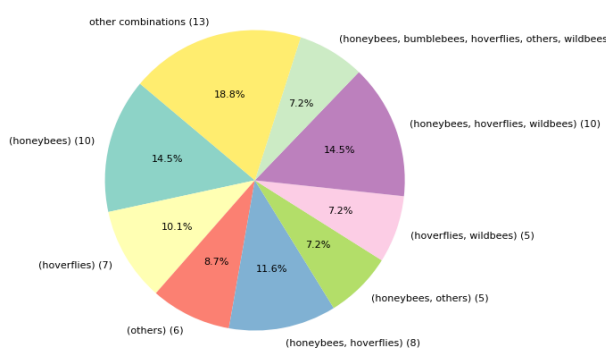
Frequency of pollinator combinations observed on *Salvia* spp



Frequency of pollinator combinations observed on *Scilla* spp



Frequency of pollinator combinations observed on *Solidago* spp



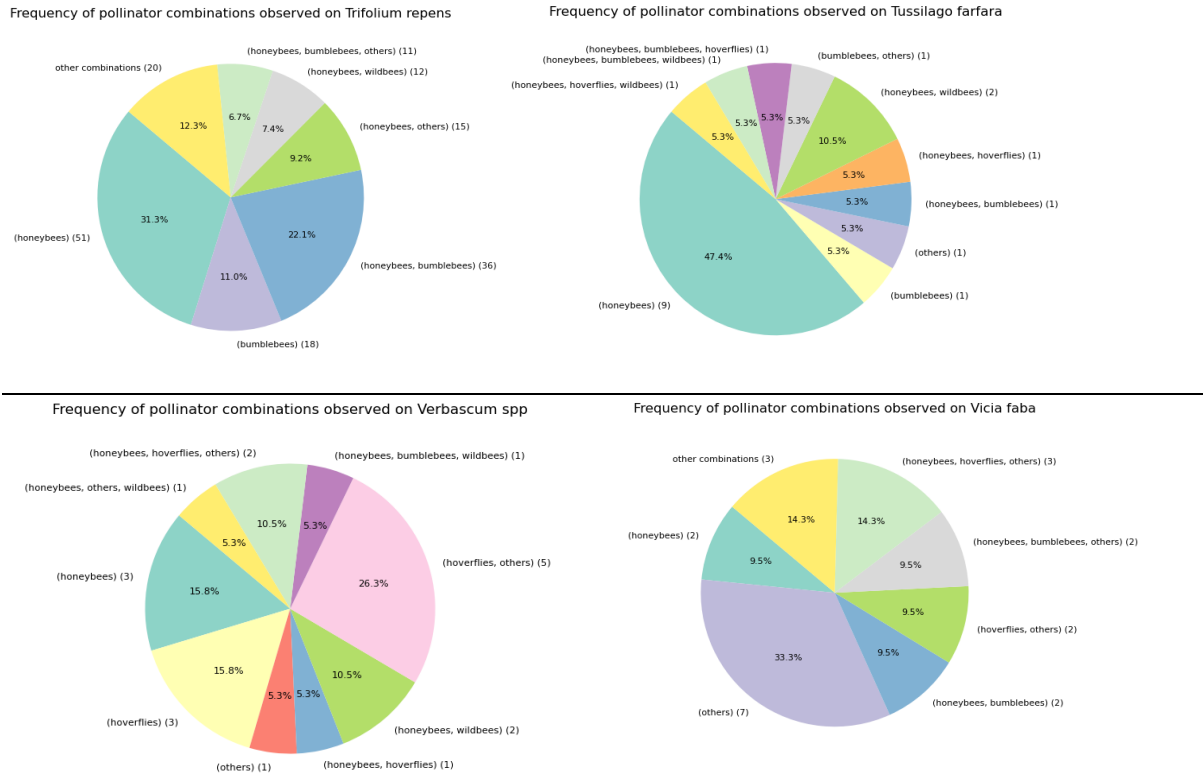


Figure IX: Combinations of pollinating insects on plants

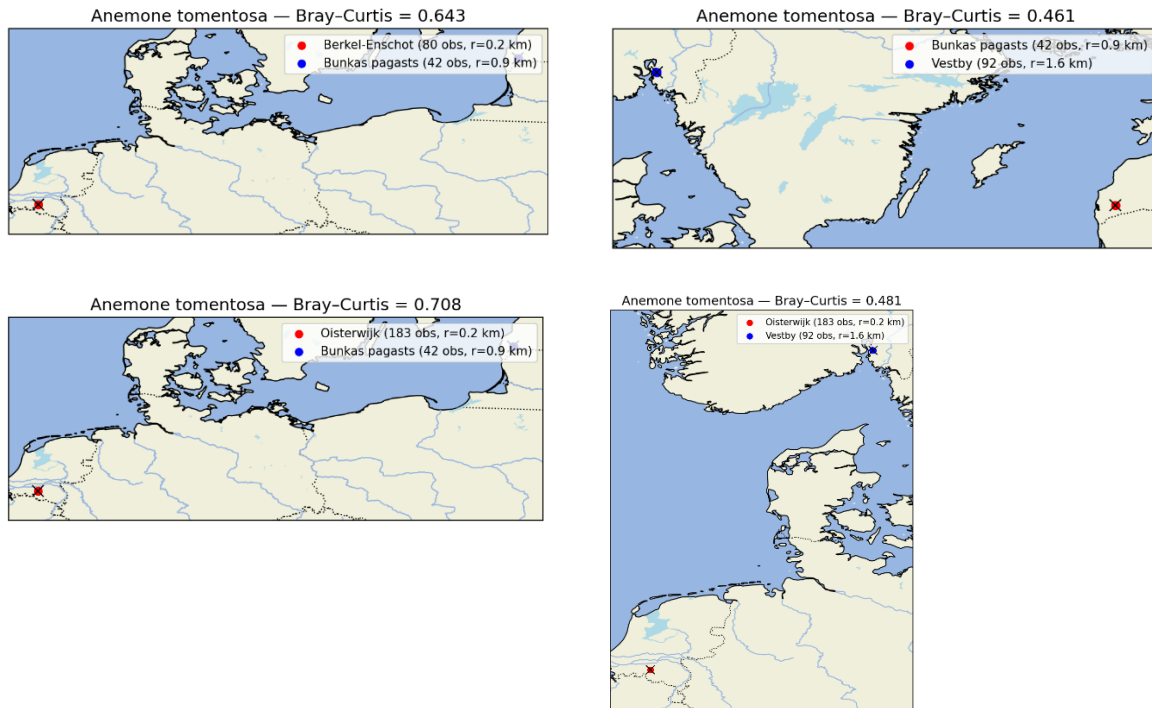
Dissimilarity over 2 locations

Map 1 to 17 show, per plant, the two locations, number of observations and the radius, applied for the Bray Curtis index calculations.

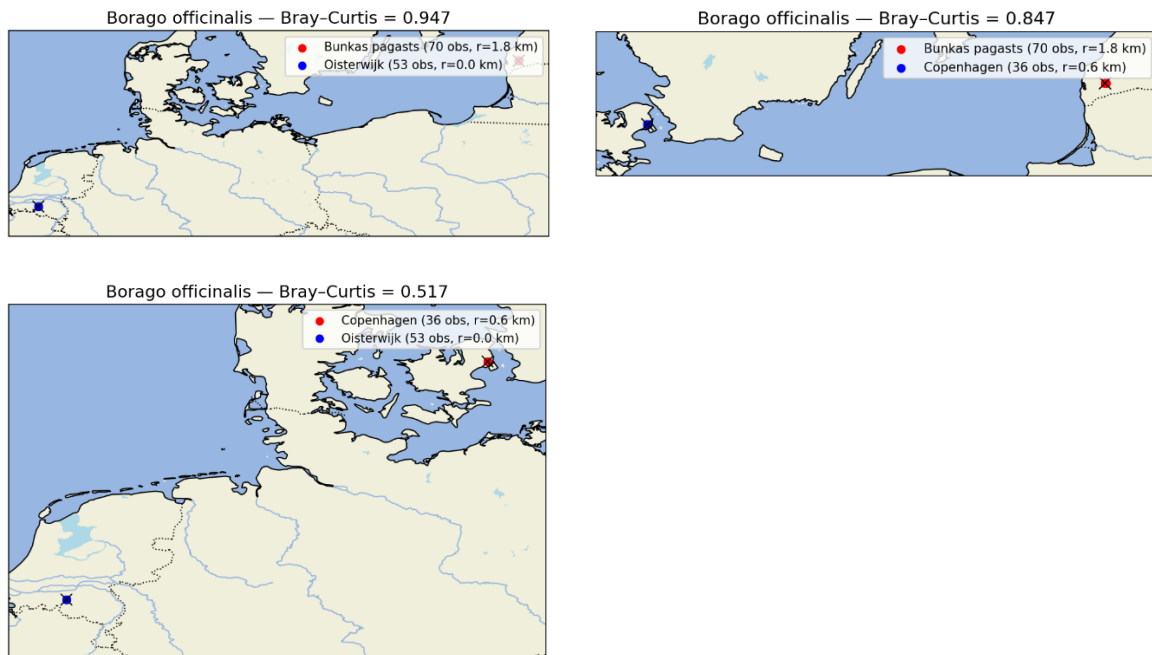
Table 7. Plant, the two locations, number of observations and the radius, applied for the Bray Curtis index calculations

Map	plant	locations
Map 1	<i>Anemona tomentosa</i>	Berkel Enschoot – Bunkas pagasts
	<i>Anemona tomentosa</i>	Bunkas pagasts – Vestby
	<i>Anemona tomentosa</i>	Oisterwijk - Bunkas pagasts
	<i>Anemona tomentosa</i>	Oisterwijk - Vestby
Map 2	<i>Borago officinalis</i>	Bunkas pagasts – Oisterwijk
	<i>Borago officinalis</i>	Bunkas pagasts – Copenhagen
	<i>Borago officinalis</i>	Copenhagen - Oisterwijk
Map 3	<i>Cirsium spp / Carduus spp</i>	Berkel Enschoot – Copenhagen
	<i>Cirsium spp / Carduus spp</i>	Oisterwijk - Copenhagen
Map 4	<i>Cragaeus monogyna</i>	Copenhagen - Vestby
Map 5	<i>Crepis spp</i>	Oisterwijk - Arnhem

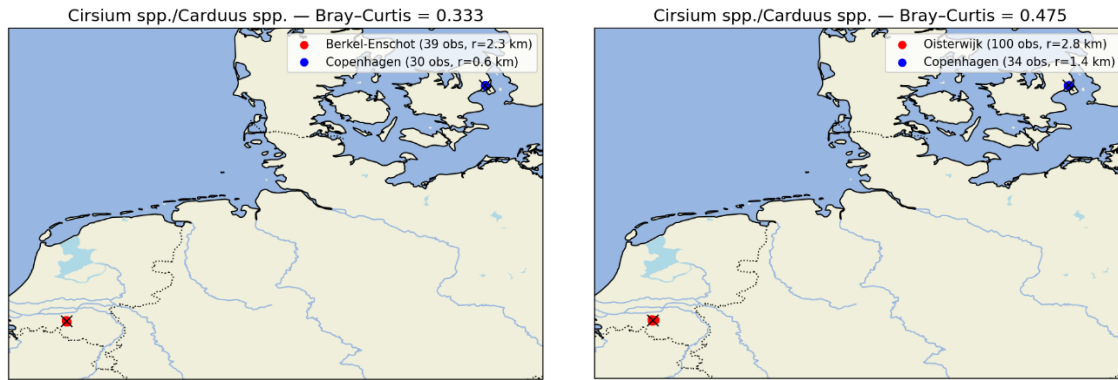
Map 6	<i>Dasiphora fructosa</i>	Bunkas pagasts – Vestby
Map 7	<i>Geranium spp</i>	Berkel Enschoot - Copenhagen
	<i>Geranium spp</i>	Oisterwijk - Copenhagen
	<i>Geranium spp</i>	Oisterwijk - vestby
Map 8	<i>Hydrangea spp</i>	Bunkas pagasts – Berkel Enschoot
	<i>Hydrangea spp</i>	Bunkas pagasts - Oisterwijk
Map 9	<i>Lavendula angustifolia</i>	Berkel Enschoot - Bunkas pagasts
	<i>Lavendula angustifolia</i>	Berkel Enschoot - Copenhagen
	<i>Lavendula angustifolia</i>	Bunkas pagasts – Copenhagen
	<i>Lavendula angustifolia</i>	Oisterwijk - Bunkas pagasts
	<i>Lavendula angustifolia</i>	Oisterwijk - Copenhagen
Map 10	<i>Malus x domestica</i>	Copenhagen – Vester Vandet
	<i>Malus x domestica</i>	Copenhagen – Vestby
	<i>Malus x domestica</i>	Vestby - Vester Vandet
Map 11	<i>Origanum vulgare</i>	Copenhagen - Vestby
	<i>Origanum vulgare</i>	Oisterwijk - Copenhagen
	<i>Origanum vulgare</i>	Oisterwijk - Vestby
Map 12	<i>Rosa spp</i>	Berkel Enschoot - Bunkas pagasts
	<i>Rosa spp</i>	Berkel Enschoot - Copenhagen
	<i>Rosa spp</i>	Copenhagen - Bunkas pagasts
	<i>Rosa spp</i>	Oisterwijk - Bunkas pagasts
	<i>Rosa spp</i>	Oisterwijk - Copenhagen
Map 13	<i>Scilla spp</i>	Copenhagen - Vestby
Map 14	<i>Symphoricarpus spp</i>	Copenhagen - Vestby
Map 15	<i>Symphytum spp</i>	Bunkas pagasts - Oisterwijk
Map 16	<i>Taraxacum officinale</i>	Copenhagen - Vestby
Map 17	<i>Trifolium repens</i>	Bunkas pagasts - Oisterwijk
	<i>Trifolium repens</i>	Bunkas pagasts - Vestby
	<i>Trifolium repens</i>	Vestby - Oisterwijk



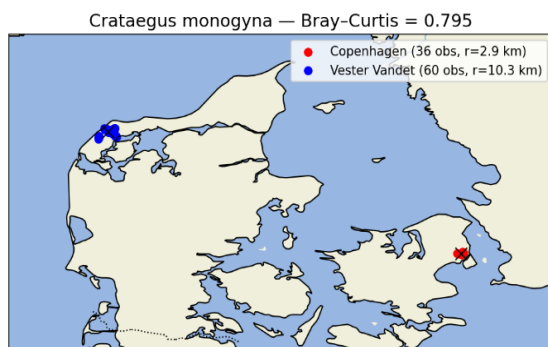
Map 1. *Anemone tomentosa*



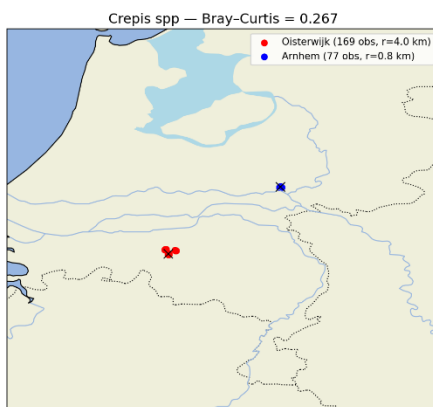
Map 2. *Borago officinalis*



Map 3. *Cirsium spp / Carduus spp*



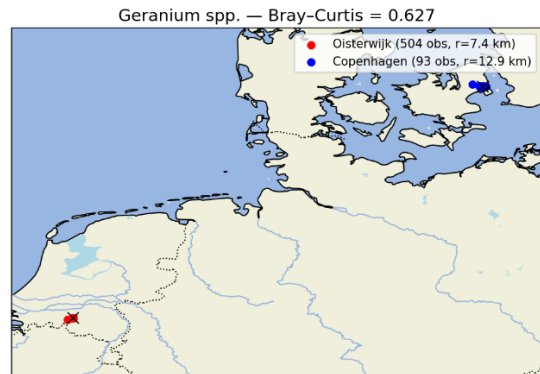
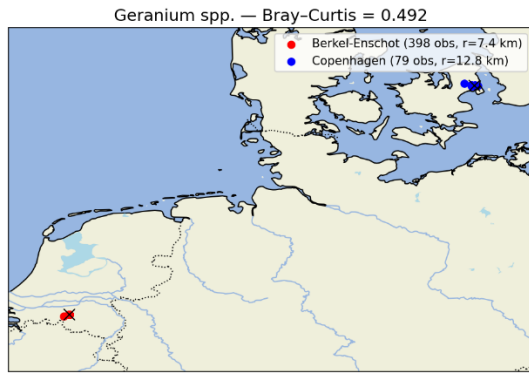
Crataegus monogyna



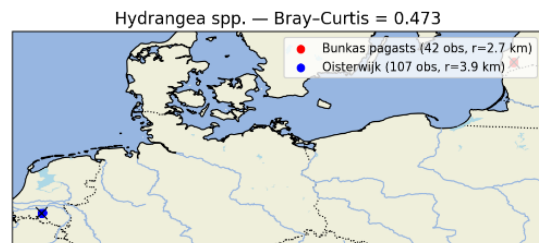
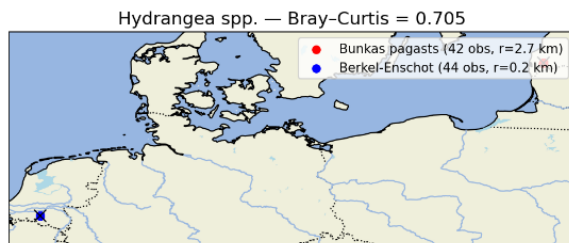
Map 5. *Crepis spp*



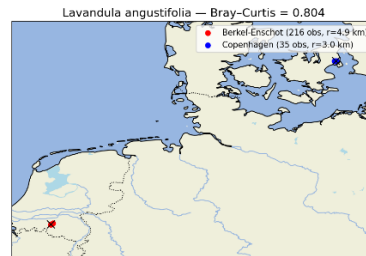
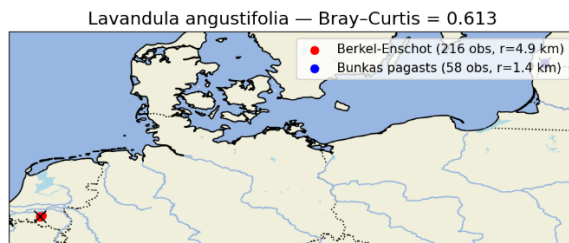
Map 6. *Dasiphora fructosa*

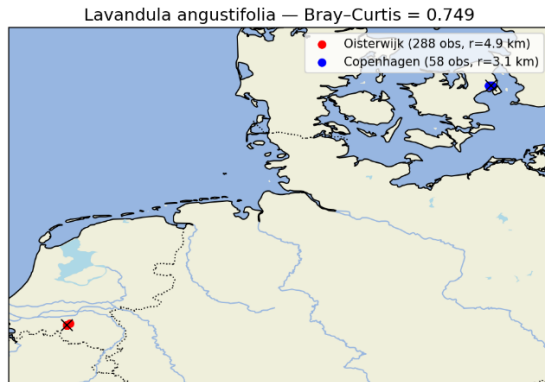
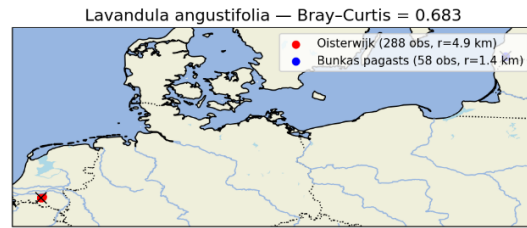
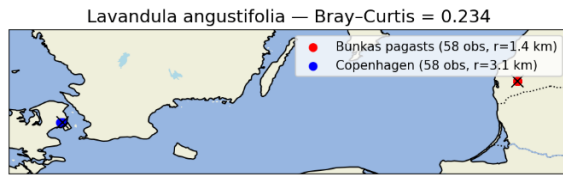


Map 7. Geranium spp

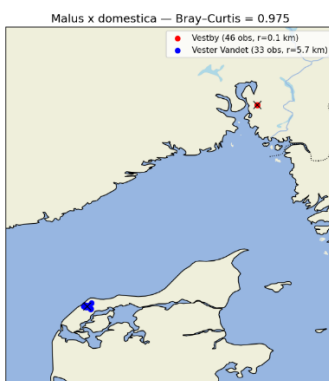
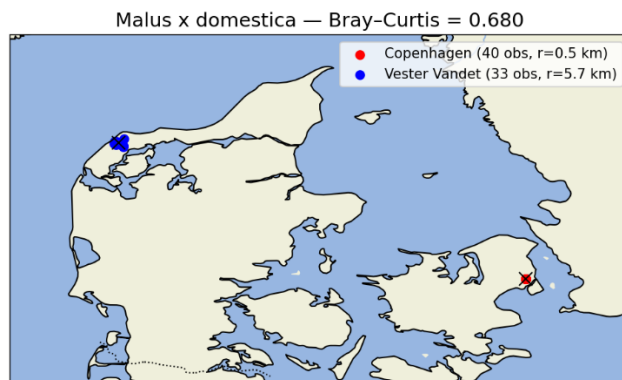


Map 8. Hydrangea spp





Map 9. *Lavandula angustifolia*

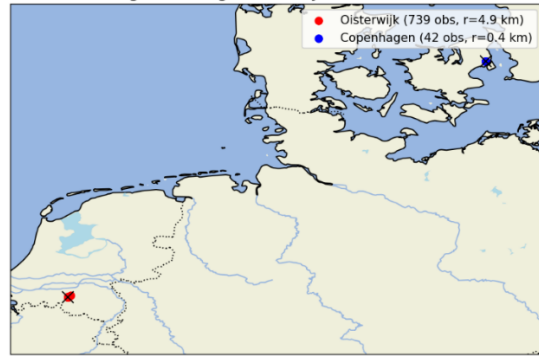


Map 10. *Malus x domestica*

Origanum vulgare — Bray-Curtis = 0.492



Origanum vulgare — Bray-Curtis = 0.818



Origanum vulgare — Bray-Curtis = 0.562

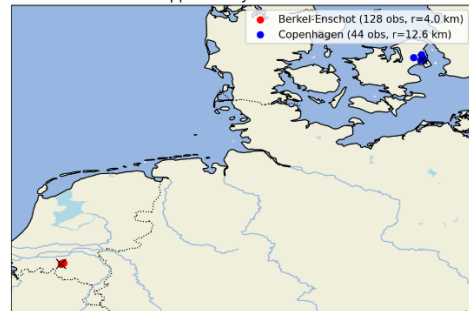


Map 11. *Origanum vulgare*

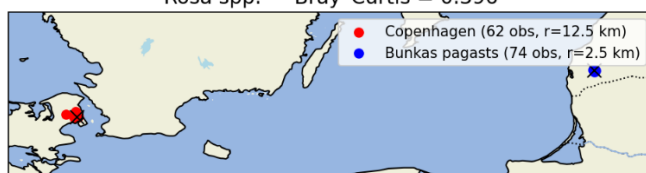
Rosa spp. — Bray-Curtis = 0.356



Rosa spp. — Bray-Curtis = 0.275

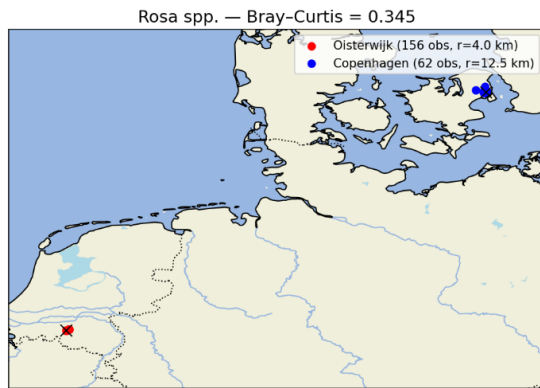


Rosa spp. — Bray-Curtis = 0.396



Rosa spp. — Bray-Curtis = 0.450

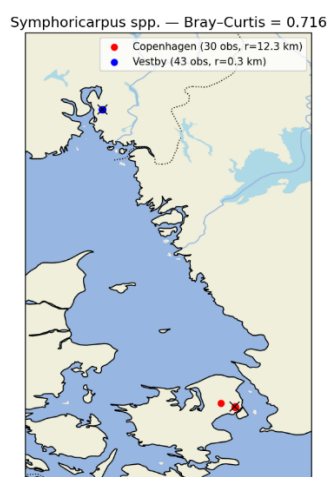




Map 12. Rosa spp



Map 13. Scilla spp



Map 14. Symphoricarpus spp

Symphytum spp. — Bray-Curtis = 0.519



Map 15. *Symphytum* spp

Taraxacum officinale ssp. — Bray-Curtis = 0.724



Map 16. *Taraxacum officinale*

Trifolium repens — Bray-Curtis = 0.799



Trifolium repens — Bray-Curtis = 0.280



Trifolium repens — Bray-Curtis = 0.773



Map 17. *Trifolium repens*