LIFE Project Number

LIFE19 ENV/BE/000102

C.1.4 Monitoring Health effects caused by Oak Processionary

Reporting Period

01/09/2020 - 30/08/2025

Report Delivery Due Date – Actual Date

31/01/2026 – 10/12/2025

LIFE PROJECT NAME or Acronym

LIFE Oak Processionary

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1. Context

This report is a result of Action C.1.4, the monitoring of the health effects caused by the Oak Processionary Caterpillar (OPC) or Oak Processionary Moth (OPM). This report covers the whole project research period (2020 to 2024).

Currently oak processionary caterpillars (OPC) are managed mostly with biocides (Bt). However, this management approach comes with health and ecological cost. The main objective of the project is a strong reduction of the amount of biocides (Bt) used to control the OPC in favour of more ecological sound techniques.

However, alternative methods that have less negative impact, are considered more expensive and less effective, thereby increasing the risk for health problems caused by the caterpillars.

2. Objectives

To make sure the reduction in using biocides in the project area has not had a negative impact on the health status of the population, we monitored the occurrence of health complaints possibly related to OPC during the project lifetime.

2.1. Expected quantitative results:

- 20 % reduction of reported OPC casualties at the end of the project
- 50% reduction of reported effects all over Belgium and The Netherlands 5 years after the project

3. Study setup

3.1. Data sources

In Flanders and The Netherlands, general practitioners classify patients' complaints according to the International Classification of Primary Care (ICPC). However, there is not a unique code specific for complaints due to contact with OPC. Typically, the symptoms resulting from contact with OPC fall in one or more of the following categories:

ICPC-CODE	SHORT TITLE
S01	Pain/tenderness of skin
S02	Pruritus/itch
S06	Local redness/erythema/rash
S29	Other symptom/complaint skin
S98	Urticaria
A88	Adverse effect physical factor
F73	Eye infection/inflammation other
R97	Allergic rhinitis

Of the above, especially S02 pruritus/itch and S06 local redness/erythema/rash are typical symptoms associated with OPC infections. Of course, all these symptoms can be caused by numerous causes which could fluctuate in time, so the difficulty is to separate all non-OPC related cases from these data.

Early 2021 we had several meetings with INTEGO (BE) and NIVEL (NL), two organisations which collect data on health complaints for the government from circa 300 group practices of general practitioners in each country. Yearly they deliver us the data of the prevalence of specific ICPC-codes that correspond to OPC-related complaints. This allows us to monitor how health effects related to OPC evolve through the years in both countries.

INTEGO delivers us an overview of monthly reported cases of all the above symptoms in Flanders.

From the INTEGO EPI-tool, a tool to calculate incidence and prevalence rates on the INTEGO-database (Epi-tool · Intego), we can calculate the yearly number of patients, for which we used the 'Jaarlijkse contactgroup' (annual contact group). For 2024 this figure was not yet published, so we used the average number of patients of the last five years.

From these figures we can calculate or estimate:

- The monthly and yearly number of complaints per 1000 patients for all related ICPC codes and specifically for ICPC-code S02 (pruritus) and S06 (local redness), i.e. complaints possibly related to OPC; this is the unit used by INTEGO in their EPI-tool.
- The monthly and yearly number of complaints/1000 patients probably not related to OPC for S02 and S06;
- The monthly and yearly number of complaints/1000 patients probably related to OPC for S02 and S06 **(probably OPC related complaints)**;

For Flanders, these data are available as from 2000. We use the data of all the above ICPC-codes and separately for S02 (pruritus) and S06 (local redness).

NIVEL delivers us weekly figures of reported cases of the above codes S02 and S06 per 100.000 inhabitants of the Netherlands, for every week in the OPC critical period (may till September). They also publish a yearly report on their findings in a report. From these figures we can calculate:

- The monthly and yearly number of complaints per 100.000 inhabitants for ICPC-code S02 (pruritus) and S06 (local redness), so possibly related to OPC (possibly OPC related complaints)
- The monthly and yearly number of complaints probably not related to OPC for S02 and S06;
- The monthly and yearly number of complaints probably related to OPC for S02 and S06 **(probably OPC related complaints)**;

For The Netherlands, these data are available as from 2019 until September 2024. We use the data for the two above ICPC-codes.

Notice the difference between the two reporting units, INTEGO using the number of patients as basis while NIVEL uses the number of inhabitants. This makes comparison between the two datasets very difficult.

To put these findings in perspective, we compared them with the monthly and yearly number of observations of OPC as reported in Waarnemingen.be and Waarneming.nl respectively. These

websites collect and report observations from both professional and amateur naturalists. The information available are the number of:

- reported observations per month and per year;
- individual animals observed;
- number of observers;
- number of communities where the species was observed;

For this report we only use the number of OPC individuals.

Below are the observations of OPC individuals and municipalities with OPC observations registered in Waarnemingen.be and Waarneming.nl for this period.

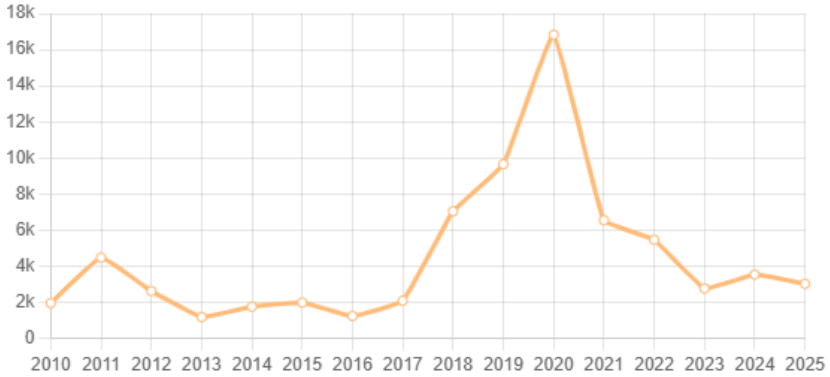

Figure 1: Evolution of OPC individuals observed in Flanders. Source: Waarnemingen.be. Accessed 01/09/2025

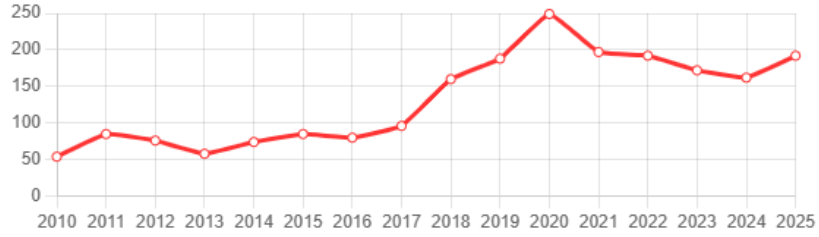

Figure 2: Evolution of municipalities with OPC observations in Flanders. Source: Waarnemingen.be. Accessed 01/09/2025

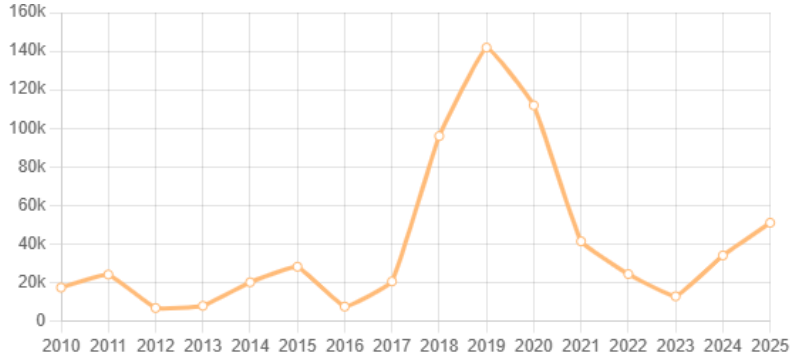

Figure 3: Evolution of OPC individuals observed in the Netherlands. Source: Waarneming.nl. Accessed 01/09/2025

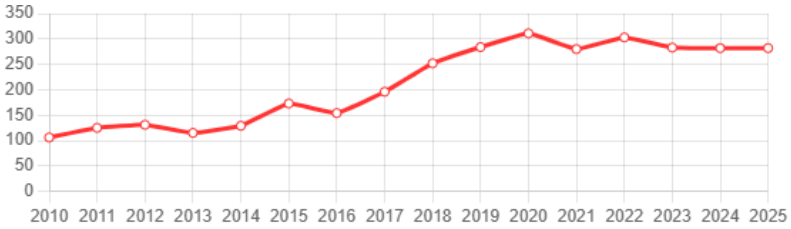

Figure 4: Evolution of municipalities with OPC observations in the Netherlands. Source: Waarnemingen.nl. Accessed 01/09/2025

We calculated the Pearson correlation coefficient between both sets of values – observations of OPM individuals vs. OPC related complaints. We expect this coefficient to be positive and close to +1.

With these, we expect to see an impact on the health issues from the start of the measurement period in 2020, so at the peak of the pressure, to 2023, when the pressure was at its lowest point.

As to see if there was any relation between probably OPC-related complaints and the amount of biocides used for combatting OPC, we compared them with the yearly amount of biocides used by the Ambassador municipalities (for the Netherlands) or by the amount of biocides reported to the VMM (for Flanders). See report 'Action C.1.1 Monitoring the use of biocides (definitive version)' for an explanation on how these figures were calculated.

Also, for the biocide use we calculated the Pearson correlation coefficient between both sets of values. If indeed the reduction of biocides used creates more health problems, we expect this coefficient to be negative and close to -1.

3.2. Baselining

As already stated, all the reported symptoms could be caused by numerous causes which could fluctuate from season to season and from year to year. For baselining the OPC related cases and setting quantitative objectives, we need to be able to differentiate between probably OPC and non-OPC related cases, by preference on a year-by-year basis.

The way we did this was to compare the number of possibly OPC related cases in the period where the OPC caterpillars are very active – the critical period (May to September) – with those in the period caterpillars are considered absent (October through April). So, we assume that all the above average cases in the critical period are caused by contact with the caterpillars, and none of the cases outside this period. The resulting numbers are considered 'probably OPC related complaints.

Since the unit of measurement, the level of detail and the number of ICPC-codes are different for both countries, we defined separate baselines and objectives for both.

For Flanders we calculated on a yearly basis the average monthly number of probably non-OPC related cases, based on the data of the non-critical period, and subtract them from the monthly cases in the critical period. The data is then converted to number of complaints per 1000 patients, a standard sized population used by INTEGO.

This calculation gives us for Flanders the baseline for 2020 of **0,96 monthly probably OPC related complaints per 1.000 patients,** and the objective of **max. 0,77 monthly probably OPC related**

complaints per 1.000 patients for 2025 and of **max. 0,48 monthly probably OPC related complaints per 1.000 patients** for 2030.

For The Netherlands we used the same procedure, but we first converted the weekly data to monthly data and used the number of complaints per 100.000 inhabitants as unit.

This calculation gives us for The Netherlands the baseline for 2020 of **41 monthly probably OPC related complaints per 100.000 inhabitants,** and the objective of **max. 33 monthly probably OPC related complaints per 100.000 inhabitants** for 2025 and of **max. 21 monthly probably OPC related complaints per 100.000 inhabitants** for 2030.

We do recognize the following potential pitfalls in using this method:

- The critical period, May through September, is also the period in which contact of the public with other sources of complaints – both plants and animals – is much larger than before and after; this means the number of probably OPC related complaints might be overestimated in this period;
- On the other hand, the risk of contact with old nests remains throughout the year; so, the figures for probably OPC related complaints for the fall and winter might be underestimated.

However, with no knowledge of the exact source of the complaint, this is the best we probably can do.

4. Results

4.1. Historical perspective

For Flanders, we have data about OPC abundance and possibly related OPC complaints available as from 2007, which can give us some historical perspective. For the Netherlands, we only have data available as form 2019.

It is clearly visible the number of possibly OPC related complaints has been growing since 2012, with more sudden increases in 2017 and 2022. Contrary to these, the number of OPC observations peaked in 2011 and 2020, with 2260 observations, and have since then steadily declined.

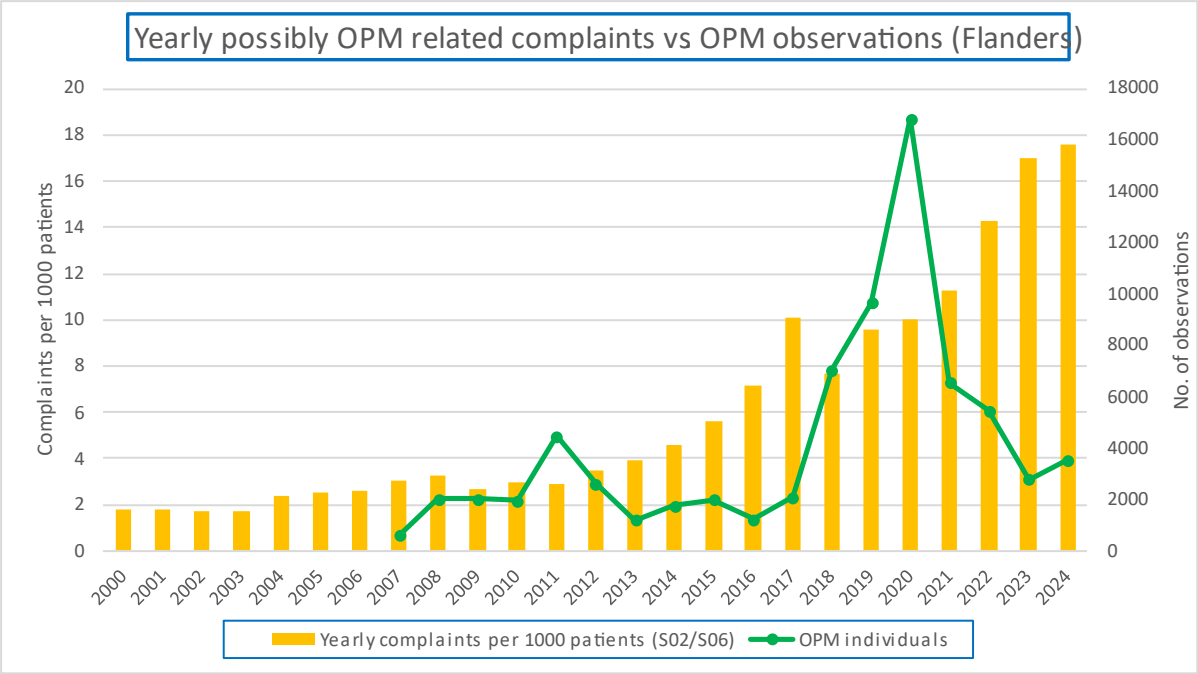

Figure 5: Yearly possibly OPM related complaints vs OPM observations

This already gives an indication that there is probably not a clear relation between the presence and abundance of OPC and the number of possibly related health complaints.

4.2. Evolution probably OPC-related complaints vs. targets

According to our analysis the objective for 2025 – a 20 % reduction of reported OPC casualties versus 2020, was not met.

In the Netherlands, the number op probably OPC related complaints has been decreasing since 2020, but it rose again in the last reporting year.

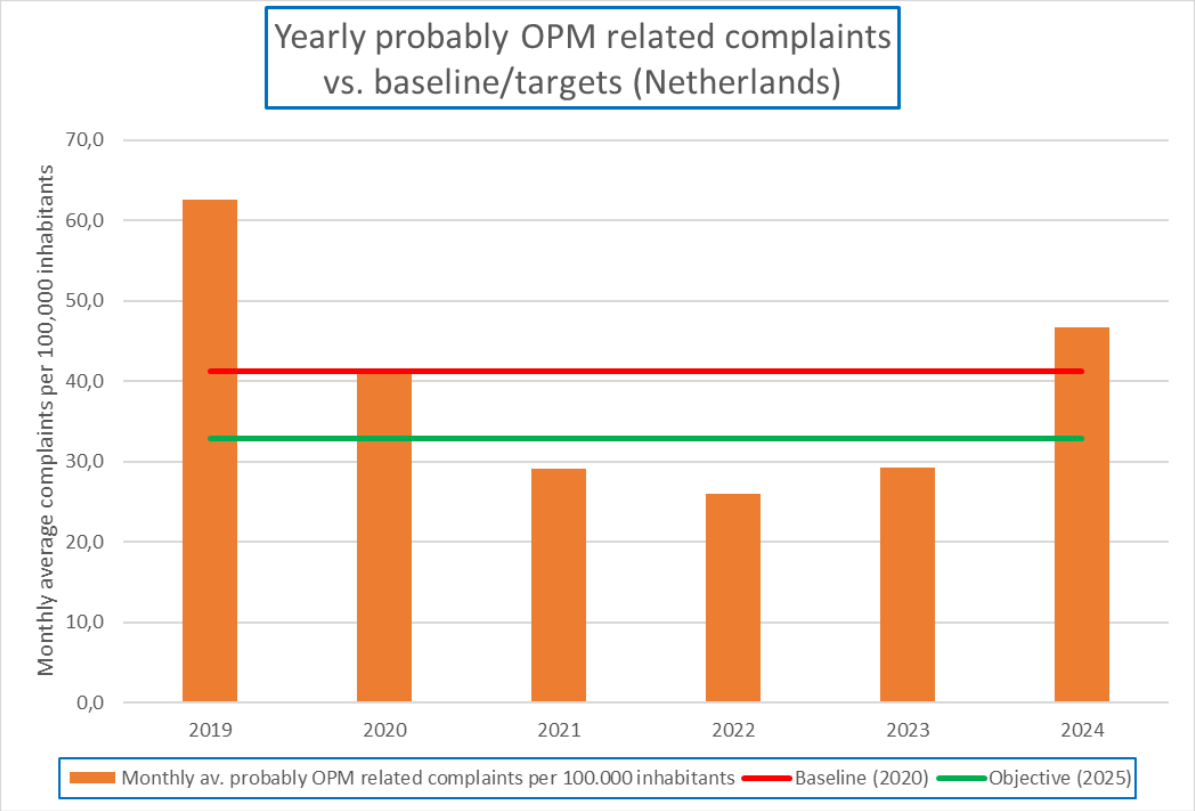

Figure 6: Yearly probably OPM related complaints vs. baseline/targets (the Netherlands)

In Flanders, we see the opposite: the number of probably OPC related complaints slightly rose in 2021, after we took the baseline, and peaked in 2023. It has decreased since then, but not yet to the targeted level.

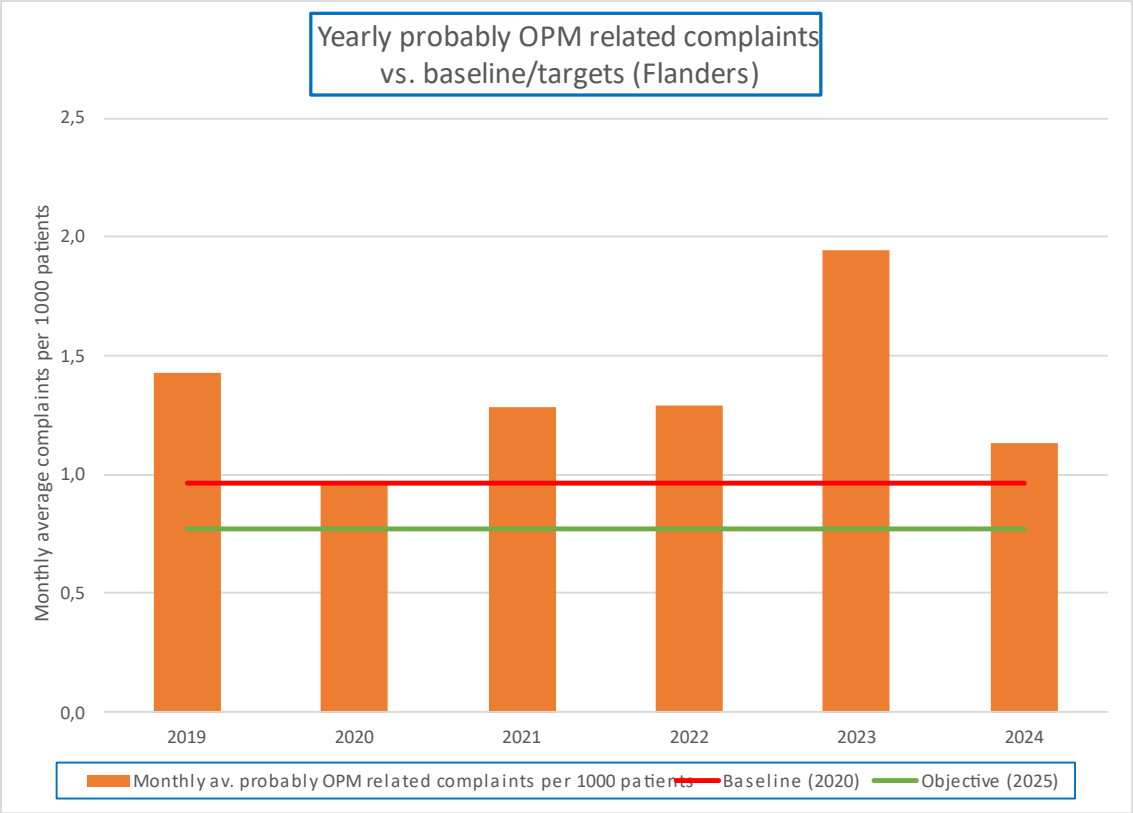

Figure 7: Yearly probably OPM related complaints vs. baseline/targets (Flanders)

In the next paragraphs we will try to find an explanation.

4.3. Impact of OPC presence on probably OPC related complaints

Both in Flanders and in the Netherlands, we see a correlation in time between OPC presence during the summer period and the numbers of probably OPC-related complaints. However, the peak heights do not always match; a lot of caterpillars do not always lead to high occurrence of complaints and vice-versa. Clearly, the presence of OPC is not the only cause of these complaints.

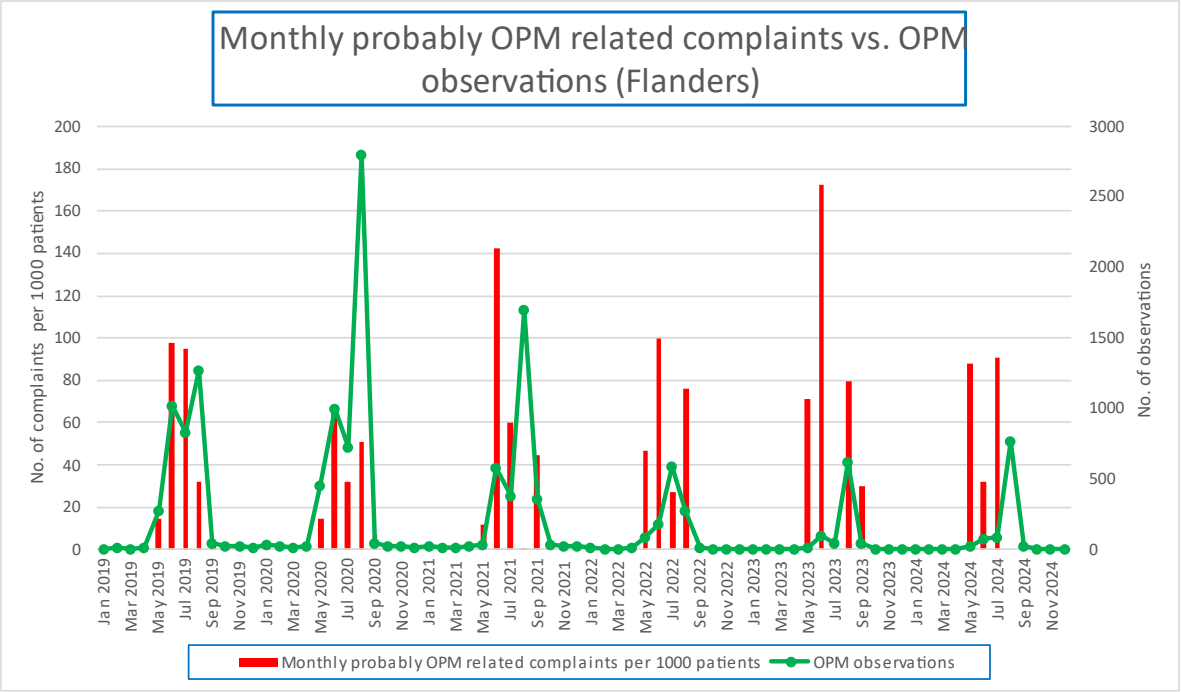

Figure 8: Monthly probably OPM related complaints vs. OPM observations in Flanders

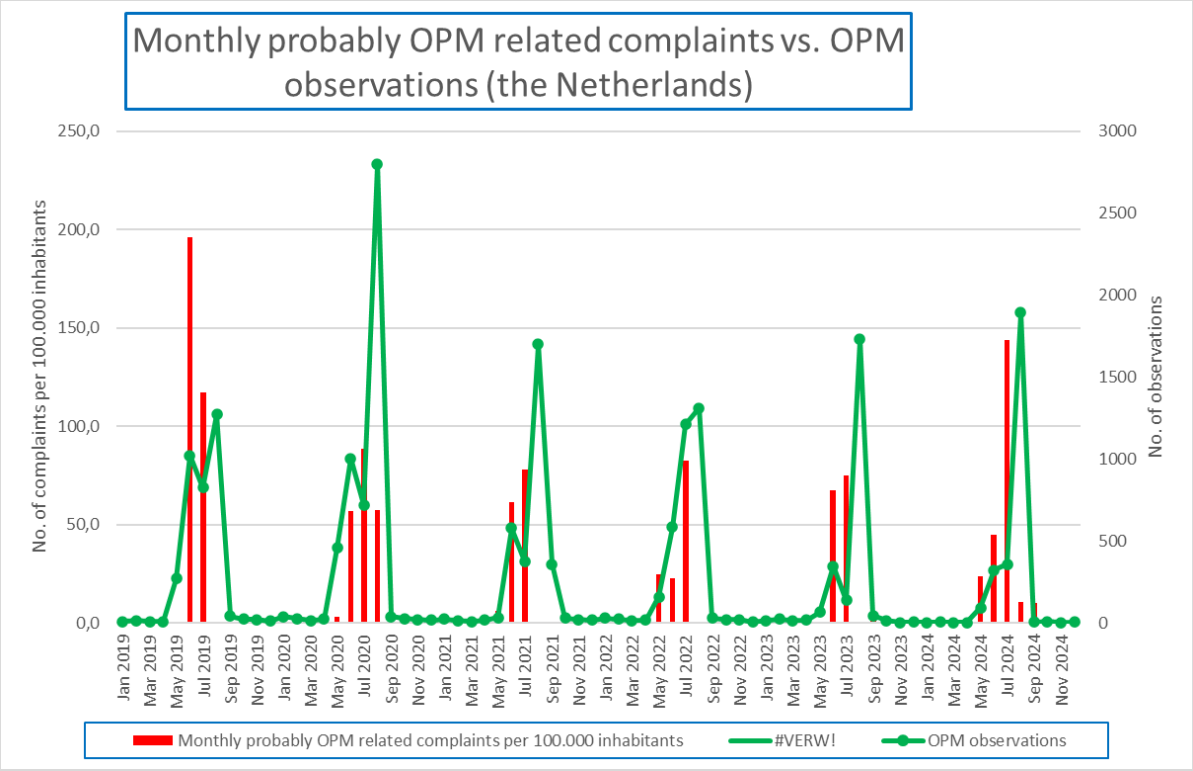

Figure 9: Monthly probably OPM related complaints vs. OPM observations in the Netherlands

4.4. Evolution of probably OPC related complaints vs. OPC observations

When comparing the number of probably OPC related complaints with OPC individuals observed for the Netherlands, some correlation is visible. In years with higher OPC populations, the number of complaints is also higher. The correlation coefficient for the full set of values was positive and high +0.80).

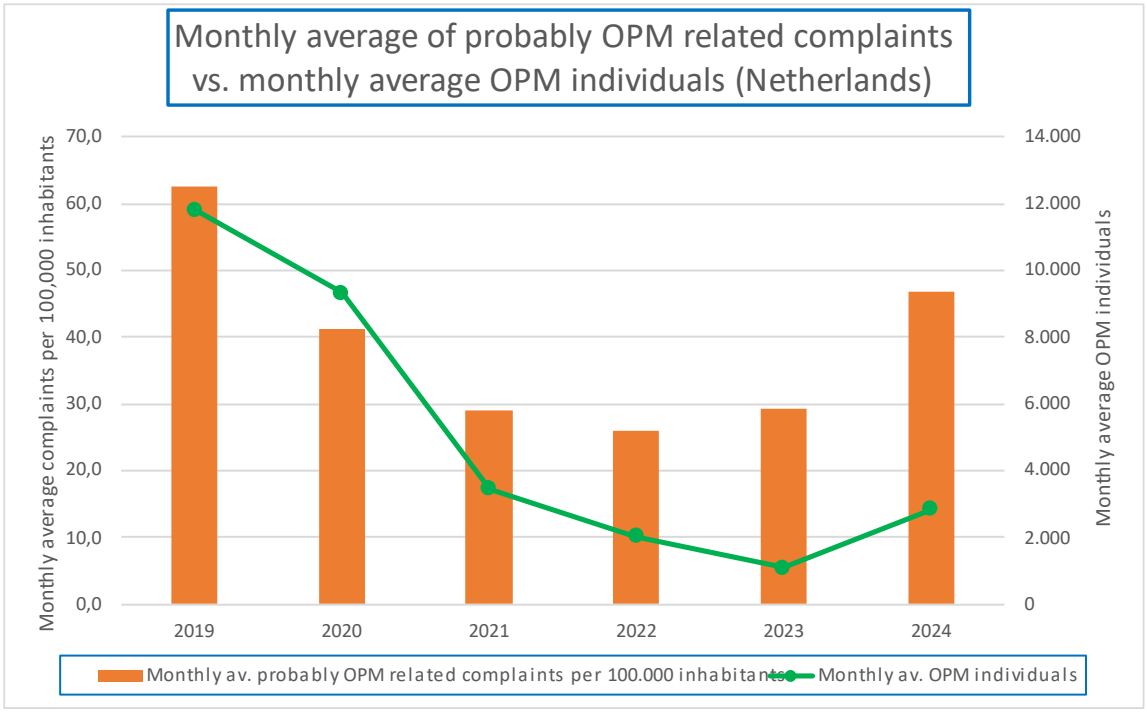

Figure 10 Monthly average of probably OPM related complaints vs. monthly average OPM individuals (Netherlands)

However, in Flanders we do not see this correlation. On the contrary, in 2021 and 2022 the number of complaints slightly rose while less OPC are observed, and in 2023 it peaked, while OPC observations were at its lowest. The correlation coefficient for the full set of values was negative and rather high (-0.77).

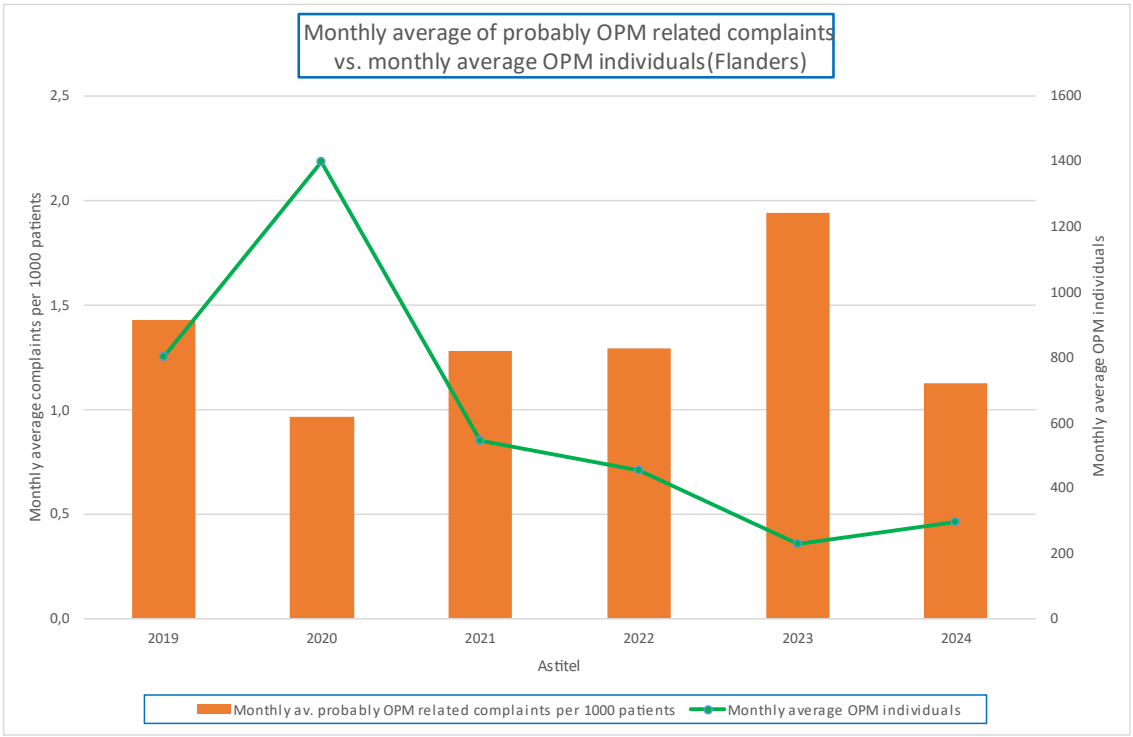

Figure 11: Monthly average of probably OPM related complaints vs. monthly average OPM individuals (Flanders)

So, at least for Flanders we see there are probably other factors causing these complaints.

After consultation with our contacts at INTEGO (KU Leuven), the additional cases of S02 and S06 in 2021 and 2022 might be linked to the four shots of COVID 19-vaccinations that started in January 2021 for two years. Pruritus and erythema were frequent side effects of these vaccinations, and this was also requested to be recorded. This however does not explain the peak of complaints in 2023 with very low OPC observations.

4.5. Evolution of probably OPC related complaints vs. biocide use

The main question to be answered in this report was, whether the reduction in biocide use in the project area has had any negative impact on the population's health. A side effect of using less biocides when caterpillars are abundant, could indeed lead to more health complaints. So, If this were the case, we would expect an increase in the number of complaints as biocide use declines.

In the Netherlands, we see a decrease in both complaints and biocide use in the first four years, and an increase in the number of complaints in 2023 and 2024 while the use of biocides was further reduced. This could point to the effect we tried to avoid. However, the correlation coefficient for the full set of values was positive but low (+0.52).

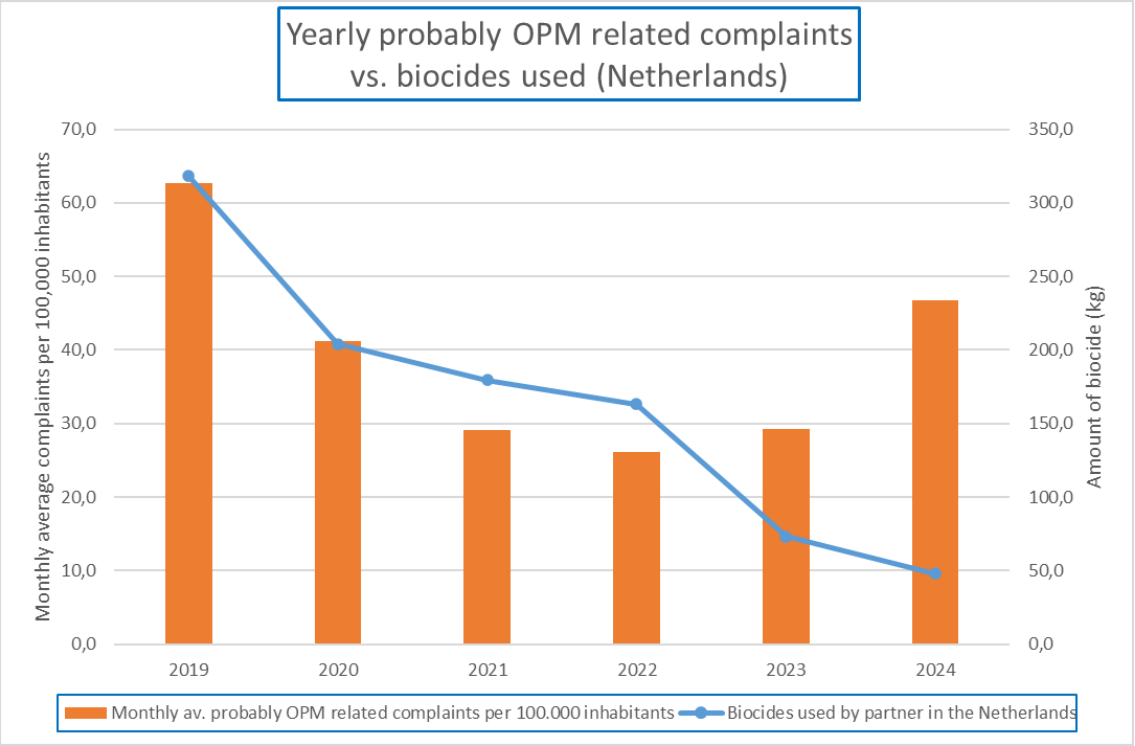

Figure 12: Yearly probably OPM related complaints vs. biocide use (the Netherlands)

In Flanders, we see the number of complaints rise and biocide use going down in 2023, which seems to indicate the same effect – however, in 2024, both indicators went down. The correlation coefficient for the full set of values was negative and rather high (-0.75).

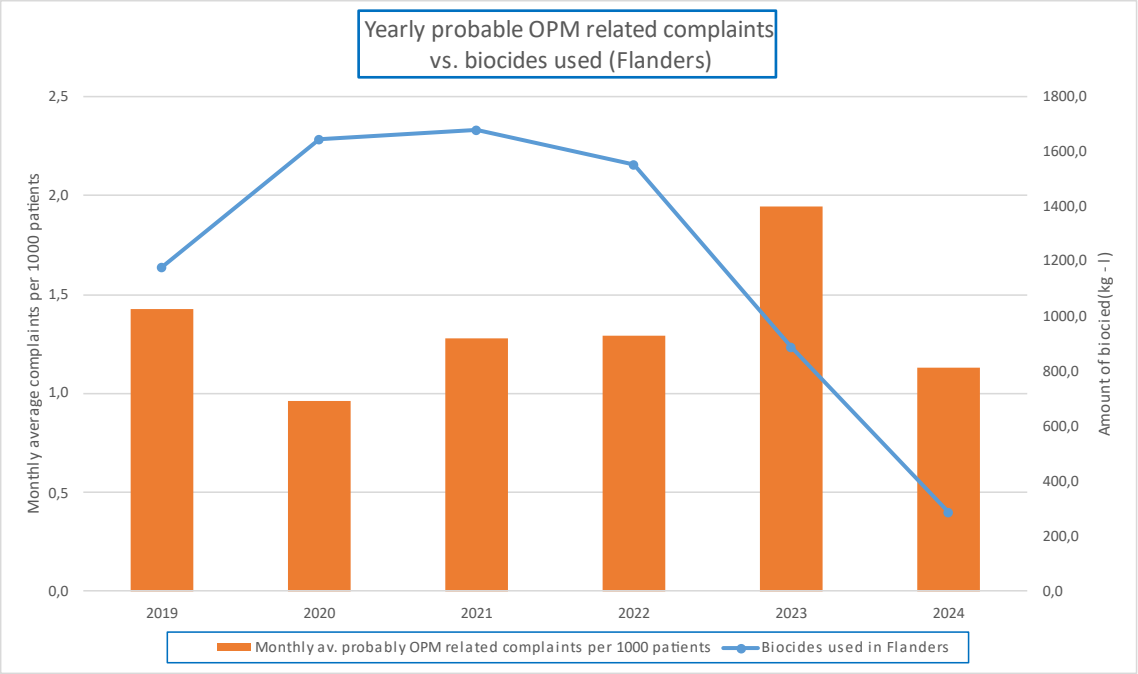

Figure 13: Yearly probably OPM related complaints vs. biocide use (Flanders)

Therefore, we see no clear correlation between the number of probably OPC related complaints and the reduction in biocides. This means the reduction in biocide use is probably not the factor causing more health complaints.

5. Conclusions

- We did not reach the target of reducing the number of probably OPC-related complaints by 20% in 2025
- On a monthly basis, there is some correlation between OPC presence on probably OPC-related complaints; however, there is no clear relationship between peak height of OPC vs. the number of complaints. So, we can conclude OPC abundance in the summer period seems to lead to additional OPC-related complaints, but other causes also play a role.
- Over the years, we find no clear relationship between the abundance of OPC and the number of OPC related complaints for both countries. OPC abundancy is clearly not the only cause for OPC-related health complaints.
- Over the years, we do not see a clear relationship between the amount of biocides used and the number of probably OPC related complaints. So, a reduction of biocide use seems to have no impact on health issues related to OPC.
- **In general, the available data does not allow us:**
    1. To determine whether symptoms are due to OPM or other factors. To be able to perform that analysis, we need more detailed information on the actual cause of the complaints, data that is not available;
    2. To quantify the extent to which the decrease in health complaints is due to a shift in management measures, or to smaller caterpillar numbers; for this, we would need detailed (local) information on OPM abundancies, biocide use, and related health

complaints, data that were not available in this project (or, for the biocide use in the Netherlands, not available for the whole country).

6. Continuation

The occurrence (nation-wide) of S02/S06 complaints on a large scale is not a good way to evaluate the impact of local OPC management measures. First, these types of complaints are too generic to find a correlation with one possible cause. There are simply too many other factors that play a role (like the COVID 19-vaccinations). And second, the health complaints data is on a scale too large to compare with the reduction of biocides, which was done mostly by the +- 40 ambassador municipalities.

Since there are no complaints uniquely linked to OPC, and data on a local scale (province or municipality) are not available in this way, there is no real added value in continuing this study.