LET'S TALK ABOUT Ambrosia !

Short conferences online organised by the
International Ragweed Society
internationalragweedsociety.org

Citizen science to tackle *Ambrosia artemisiifolia* populations and prevent future invasion ?

A case study in the Walloon region (Belgium)

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Wallonie environnement SPW

Citizen science

Citizen science : scientific research conducted with participation from the general public

➔ *Engaging people in collecting data*
➔ *Increasingly used, notably in environment-related research*
➔ *Often relying on novel technologies (smartphones)*

Citizen science

Advantages of citizen science :

- ✓ Low costs
- ✓ Enlarges the possibility of data collection

- ✓ Positive interaction between scientists and the general public / specific communities
- ✓ Awareness raising about environmental-related problems and science in general
- ✓ Feeds machine learning

Citizen science

Drawbacks of citizen science :

- Various protocols – heterogeneity of the data
- Various numerical platforms
- Delay

- Inherent biases and uncertainties
  - Non-uniform sampling locations
  - Non-uniform species selection
  - Identification errors
  - Precision uncertainty

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Use of occurrence data only

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Statistical tools

Identification algorythms

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Citizen science to tackle ragweed populations ?

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- **Project started in 2019 (4 growing seasons)**
- **Southern Belgium still at the beginning of the invasion process**

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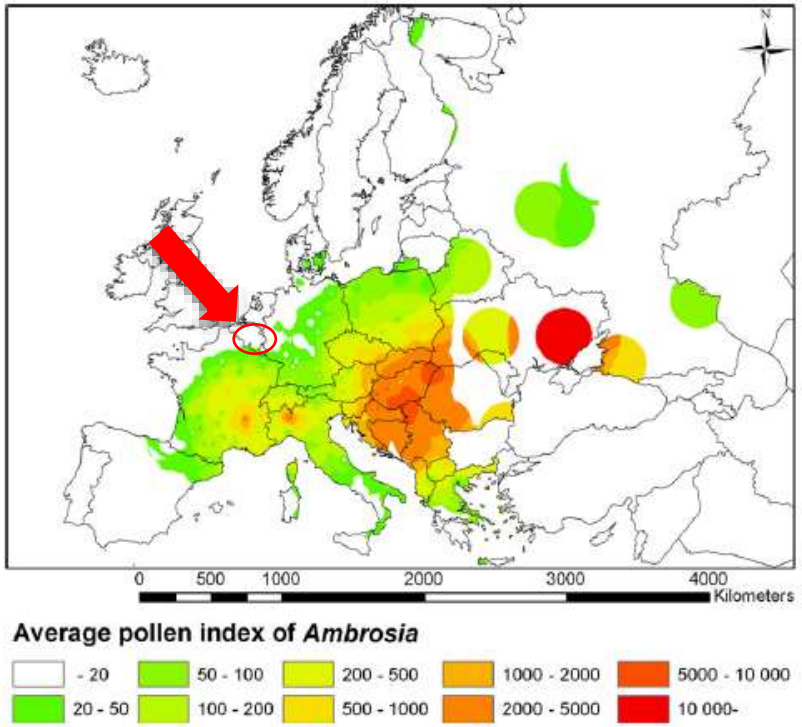
Citizen science to tackle ragweed populations ?



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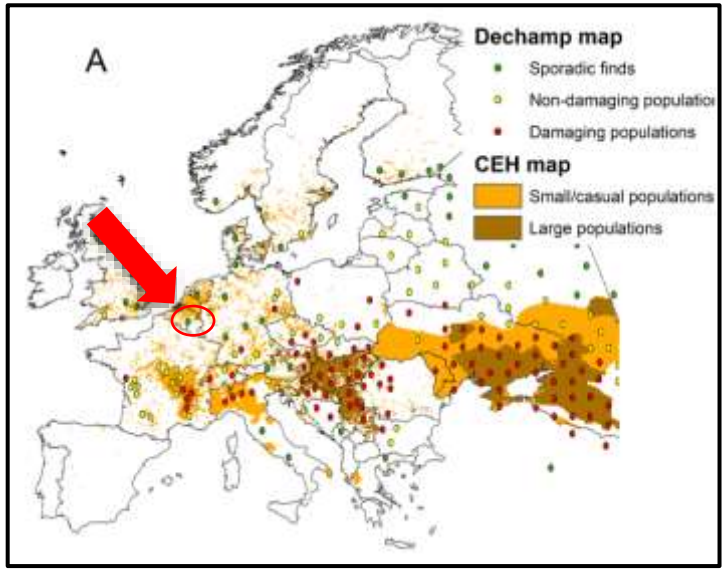

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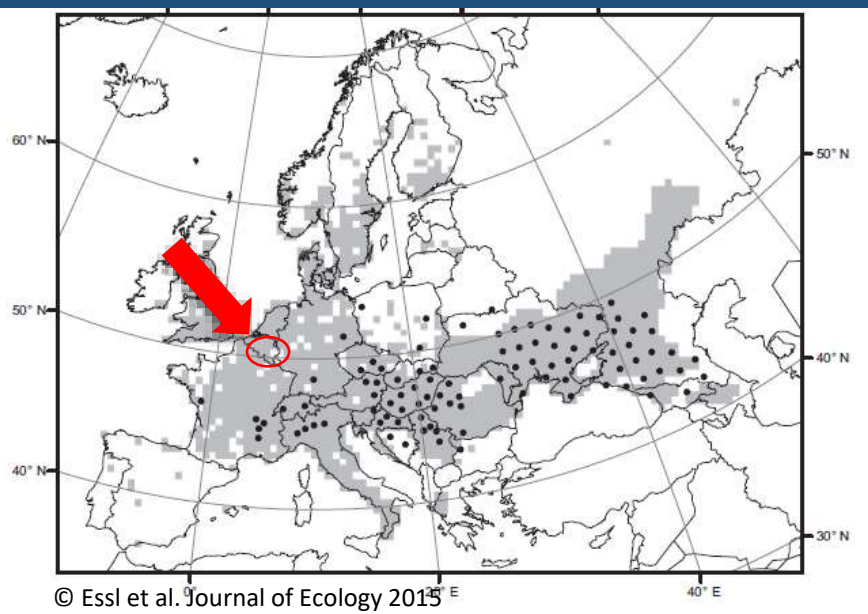

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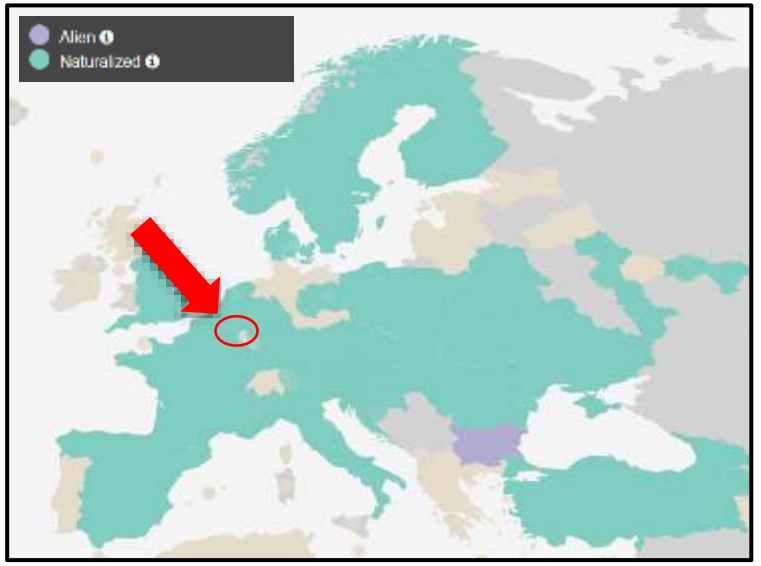

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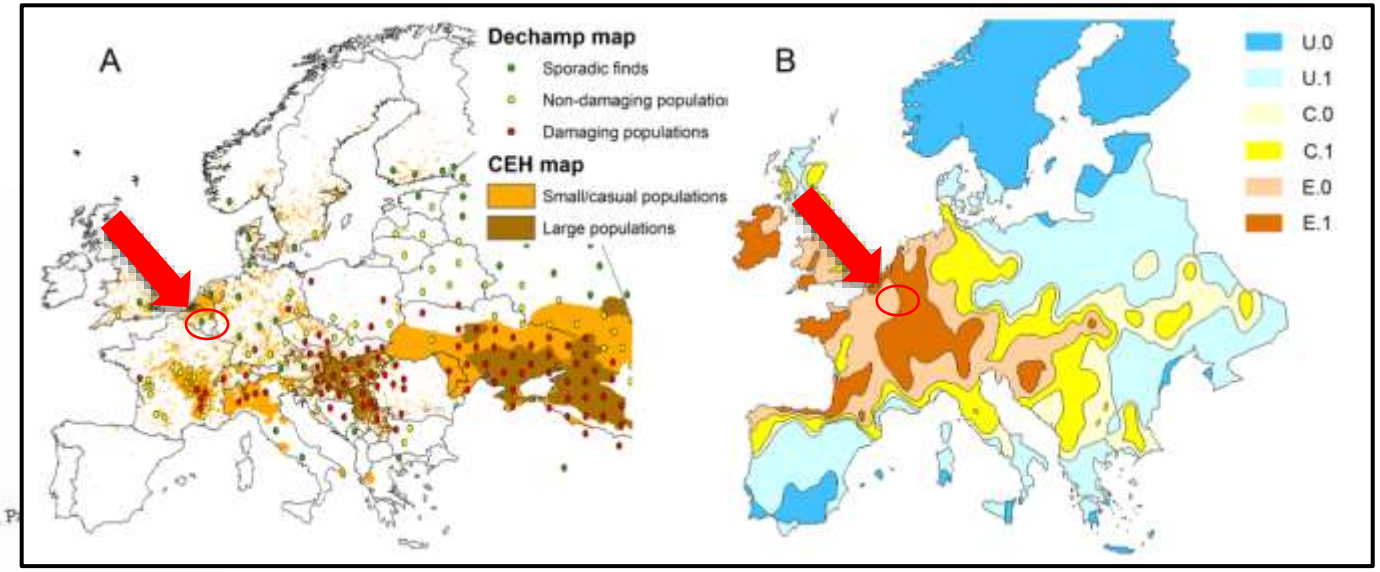
Citizen science to tackle ragweed populations ?



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B A S E *Biotechnol. Agron. Soc. Environ.* 2017 **21**(1), 12-21 OPEN ACCESS

Northern range edge equilibrium of *Ambrosia artemisiifolia* L. not achieved in Western Europe

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Description of the subject. The geographic distributions of a species, be it native or alien, is expected to be limited at some point by environmental conditions. In this situation, a range edge equilibrium (REE) takes place, *i.e.*, populations occurring beyond the edge have a growth rate reduced below replacement. The occurrence of REE has never been tested for an invasive species. In Western Europe, the invasive weed *Ambrosia artemisiifolia* L. has spread in most parts of southern and central France, where it can be found in very high densities in sunflower fields, but seems to be limited in its northwards expansion. It is currently unknown whether the range has reached a limit or not. Information about how the species responds to sunflower competition is also lacking.

Objectives. This work addressed two questions: Has the northern part of *A. artemisiifolia* invaded range in Western Europe reached REE? How is *A. artemisiifolia* performance influenced by sunflower competition?

Method. Plots were established in an agricultural field ca. 250 km north to the current invaded range, in Belgium. We planted *A. artemisiifolia* seedlings with or without sunflower competition. The following year, the population growth rates and the soil seed bank were assessed.

Results. The species established populations with relatively high growth rates and soil seed bank. Sunflower competition did not have a significant impact on plant performance.

Conclusions. The results invalidate the hypothesis of equilibrium at the current margin of *A. artemisiifolia* invaded range, and suggest a significant potential for invasion northwards.

Keywords. Geographical distribution, invasive species, interspecific competition, field experimentation, ecological factors, *Helianthus annuus*, Belgium.

L'équilibre en bordure d'aire nord n'est pas atteint pour l'invasion d'*Ambrosia artemisiifolia* L. en Europe de l'Ouest

Description du sujet. La distribution géographique d'une espèce, indigène ou invasive, peut être limitée par l'environnement. Le taux de croissance des populations au-delà de la bordure d'aire est inférieur au taux de remplacement, et

Pollens

sciensano

Méthode d'analyse: échantillonnage de type Hirst – Analyse d'1 m³ d'air par jour
Unité : nombre de grains récoltés sur une semaine (7 m³ d'air)

14/08-20/08/2023	Baudour	Bruxelles	Genk	Le Coq	Marche-en-Famenne
Amaranthaceae (Amarantes & Chénopodes)	10	6	14	2	13
Ambrosia spp. (Ambroisie)	6	5	2	0	2
Apiaceae (Ombellifères)	3	3	2	0	3
Artemisia spp. (Armoise)	**61**	**38**	**37**	**15**	**34**
Asteraceae (Autres astéracées)	0	5	1	0	8
Castanea sativa (Châtaignier)	2	2	0	0	0
Ericaceae (Ericacées)	0	0	5	0	0

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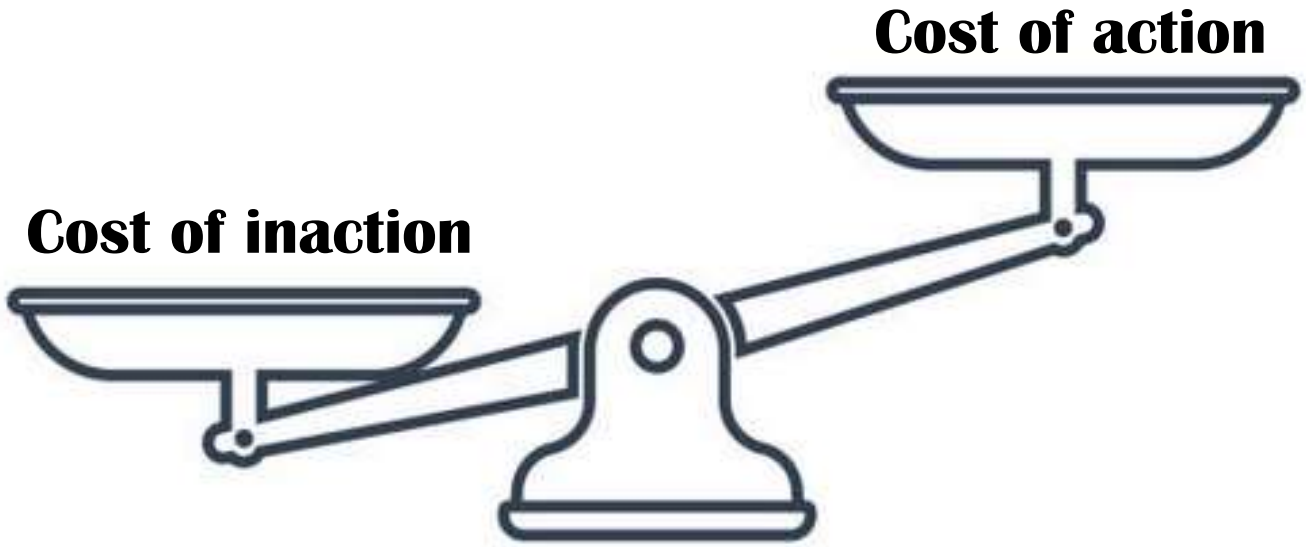

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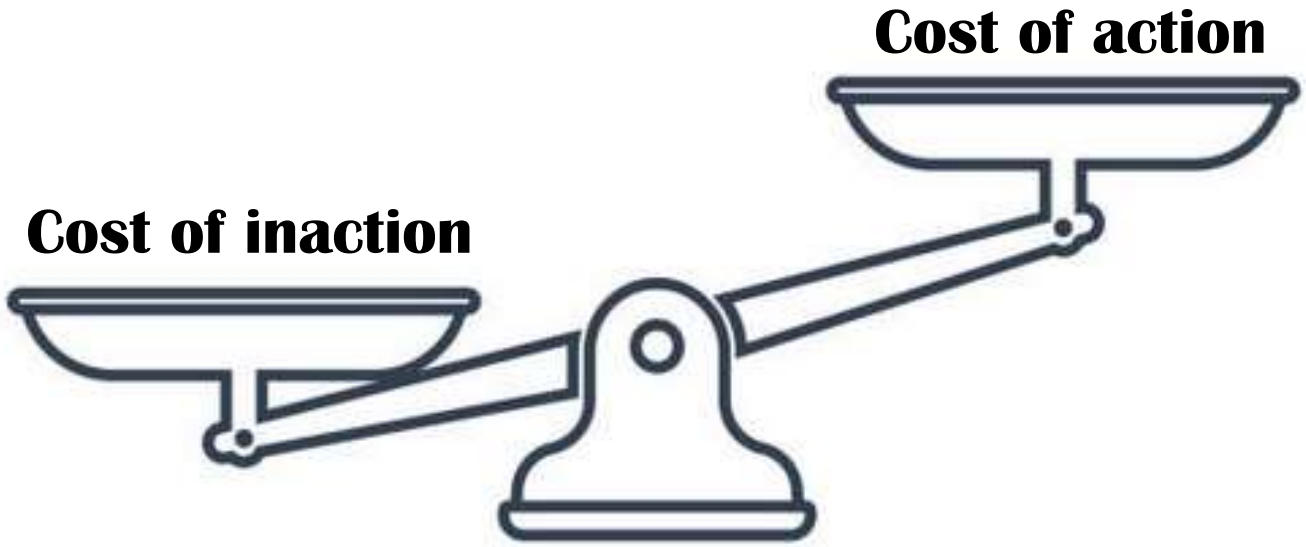

Citizen science to tackle ragweed populations ?

SEARCH

DESTROY

Citizen science to tackle ragweed populations ?

SEARCH

DESTROY

CITIZEN SCIENCE

Citizen science: different tools available…

iNaturalist

Observations.be

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Pl@ntNet

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GBIF
Global Biodiversity Information Facility

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Citizen science workflow

Information, training, social media, *etc*.

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Engage in citizen science

Naturalists – Farmers – General public

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Information, training, social media, *etc*.

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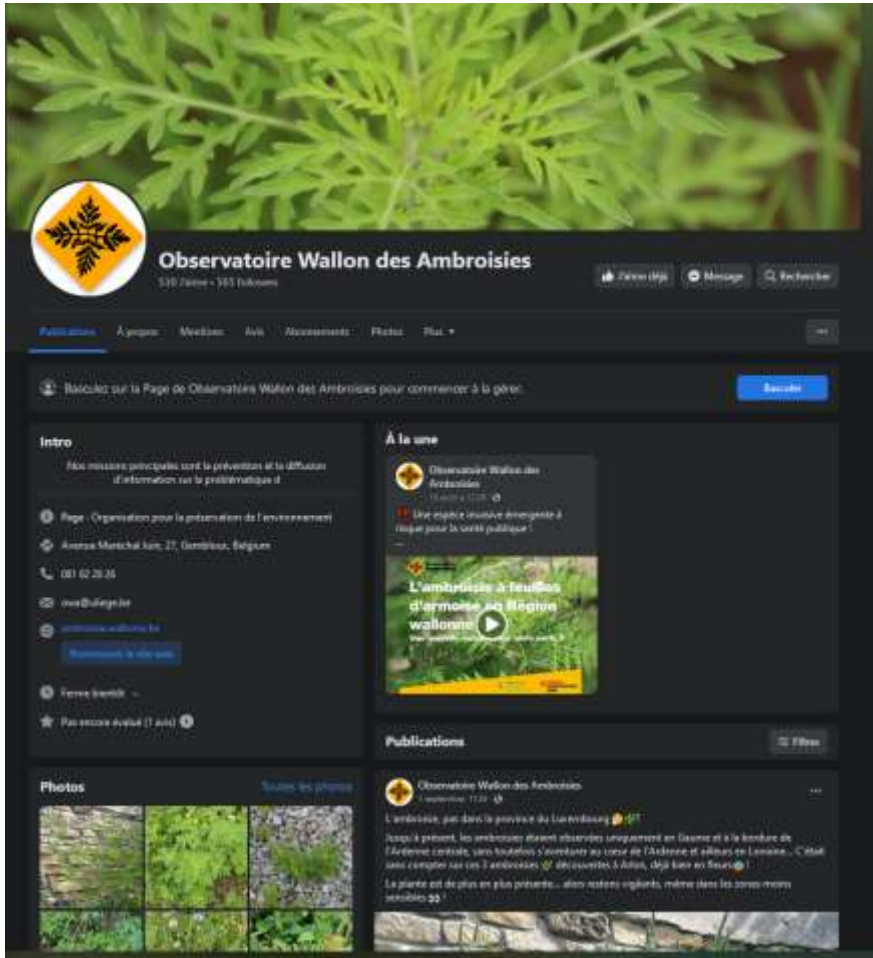


Citizen science workflow

Citizen science workflow

Information check
Contact with landowner
Population control

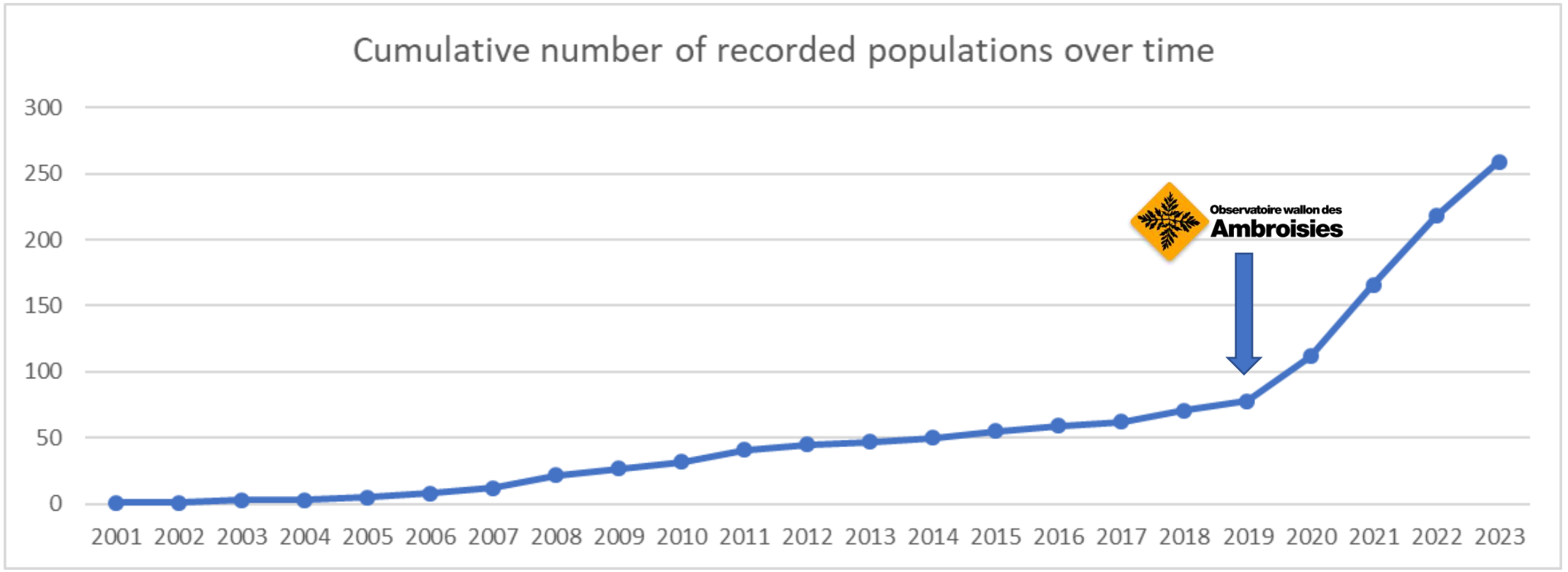
Follow up

Results

Does it work?

Results

Do people record?



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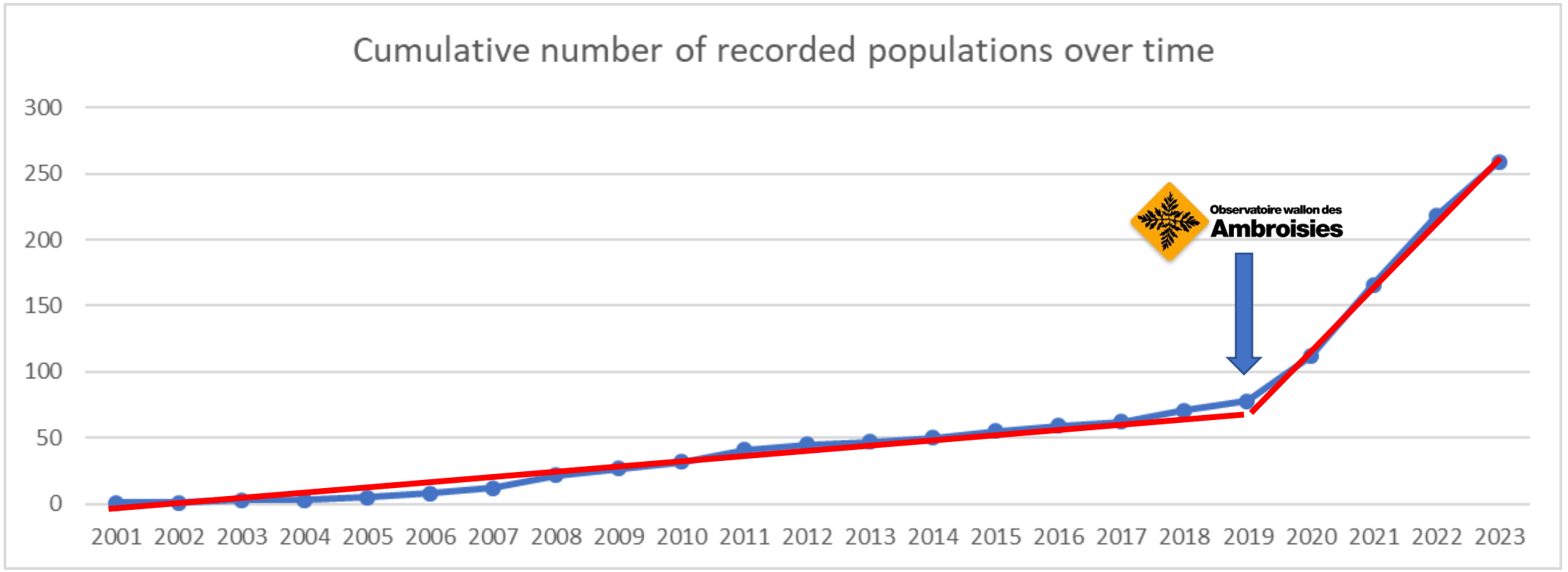

Results

Do people record?

Before projet start (2000-2020): 78 records

2020: 25 ‘old’ populations (found and managed)

2021: 27 new populations (found and managed)

2022: 27 new populations (found and managed)

2023 (in progress): 19 new populations (found and managed)

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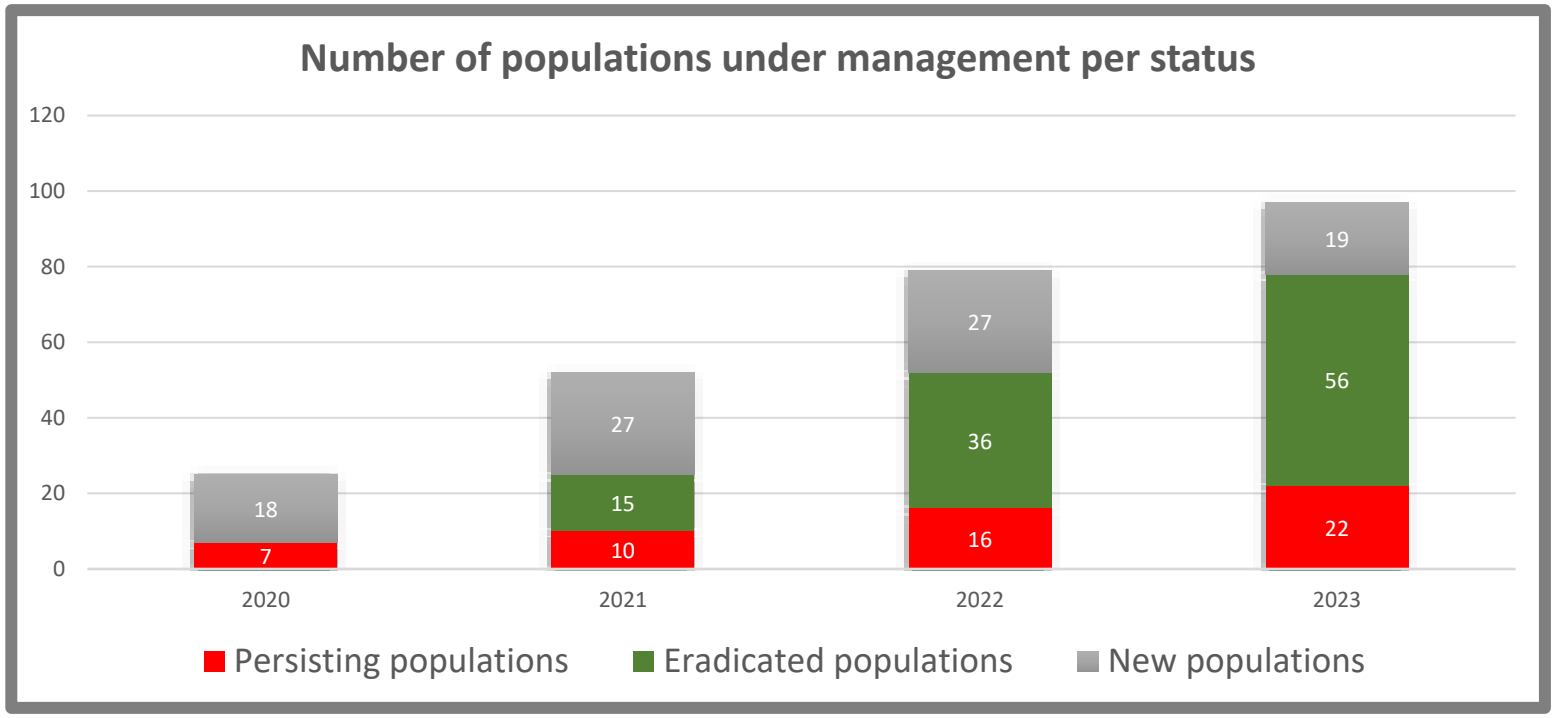
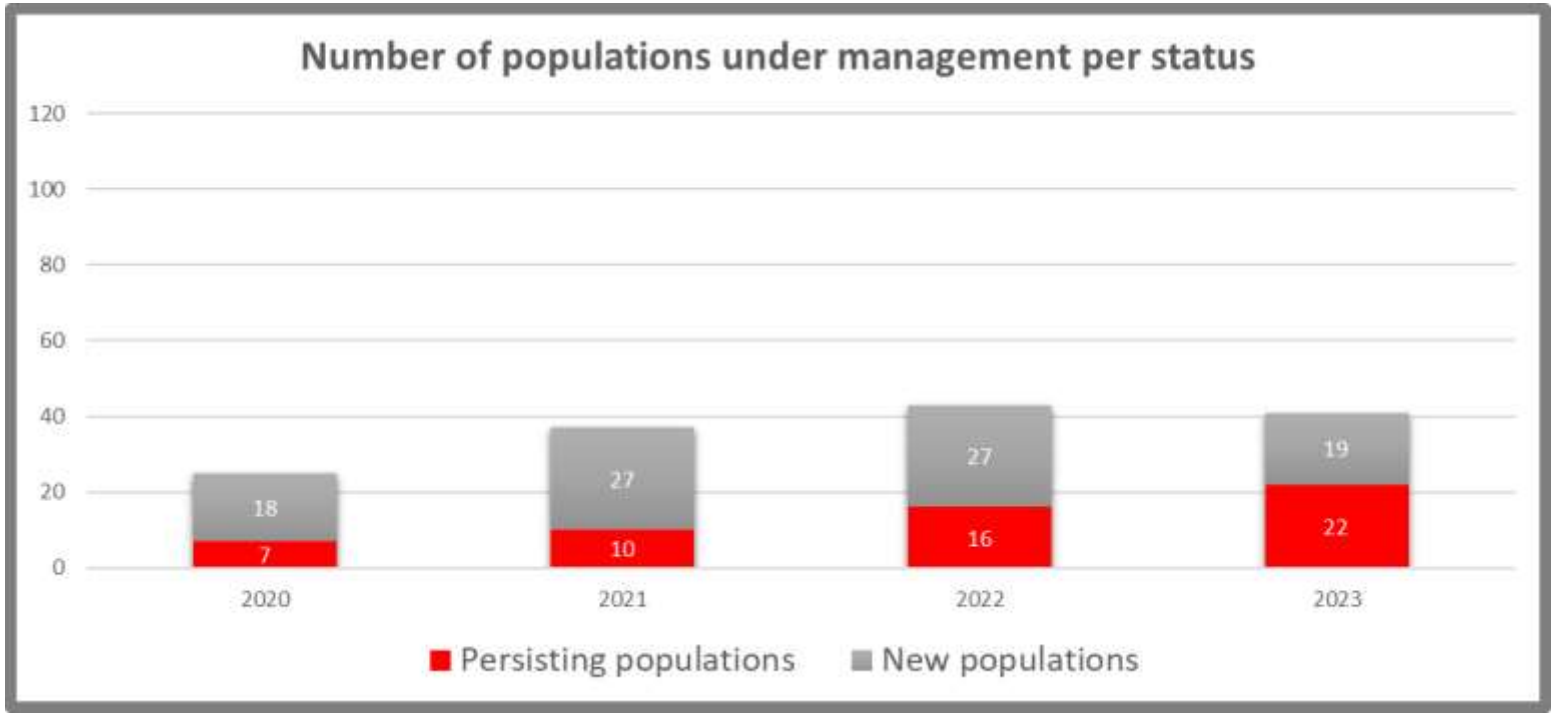
98 populations managed

Results


Number of populations under management per status
120
100
80
60
40
20
0
18
7
27
15
10
27
36
16
19
56
22
2020
2021
2022
2023
Persisting populations
Eradicated populations
New populations

Results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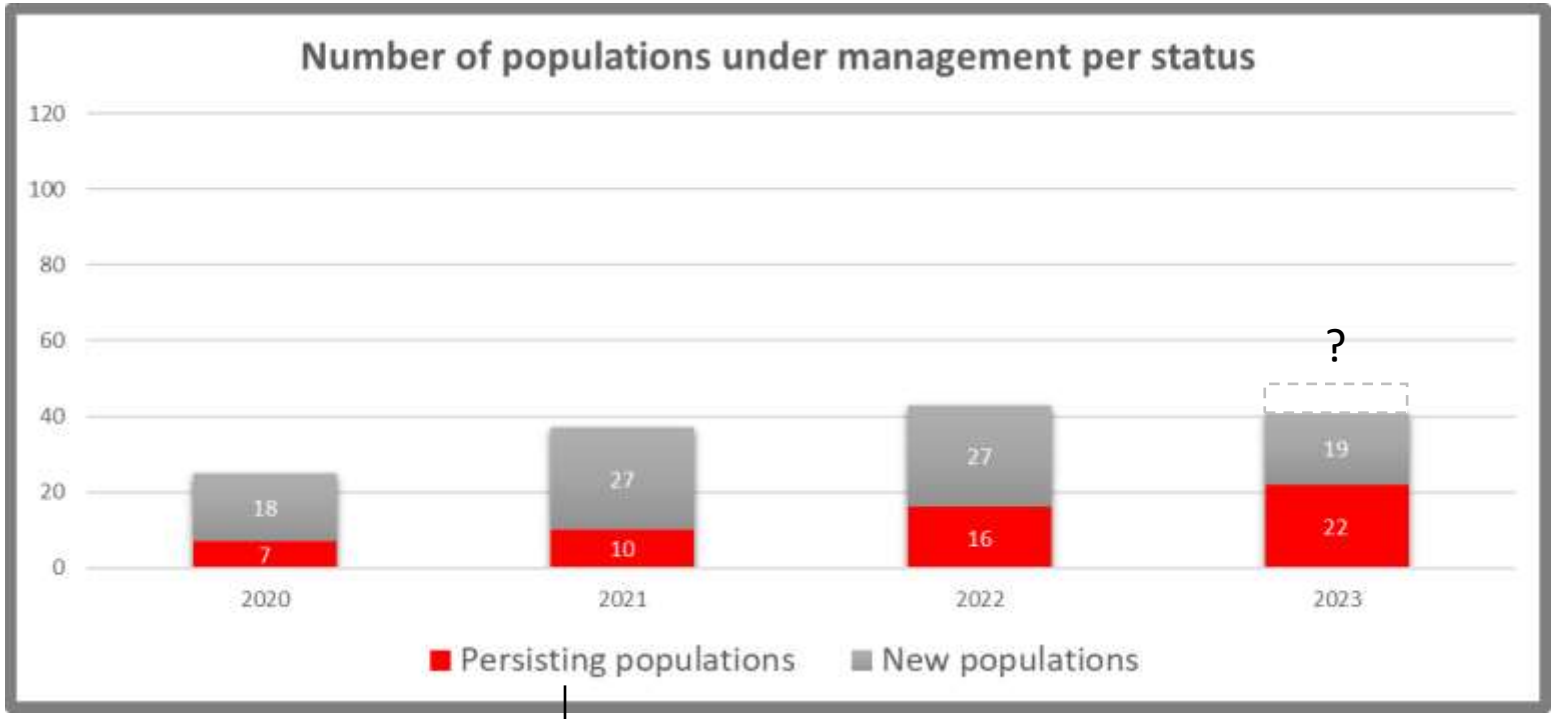

Largest populations !

Discussion

- Citizen science is a efficient tool but:
  - Not all platforms are equally used/useful
  - Training is essential
  - Records increase during flowering
  - Uncertainty remains about overlooked populations

- « Search and destroy » strategy is fruitful
  - Seems to prevent the exponential growth
  - But persisting populations accumulate through time…
  - But repeated introductions

Thank you for your attention !