



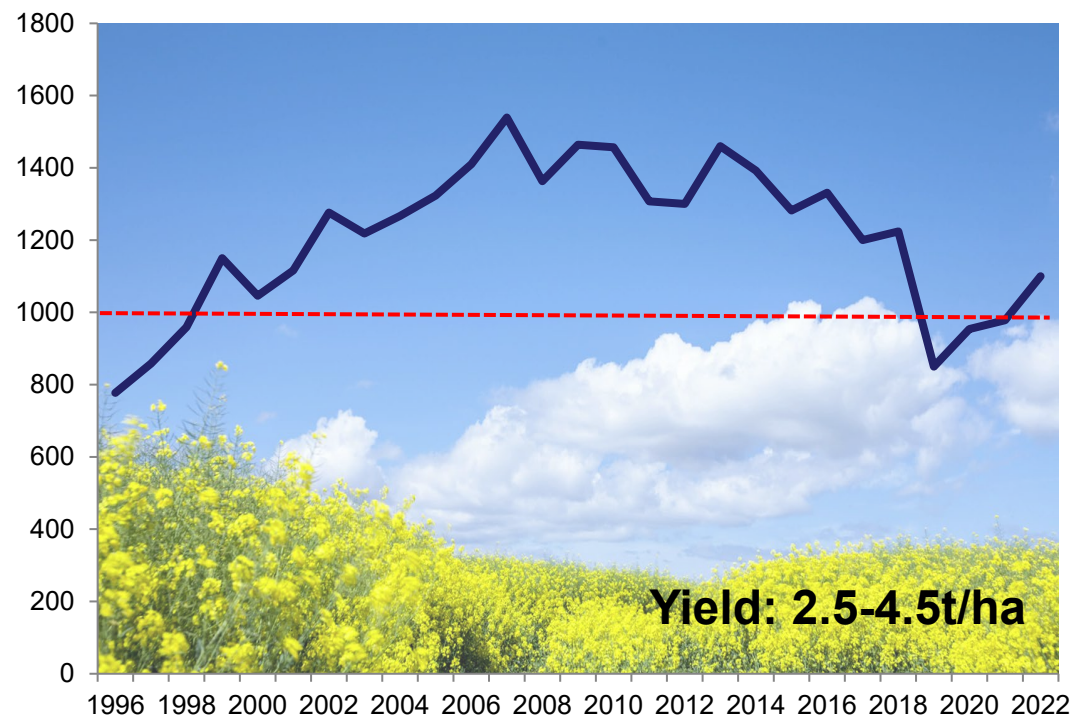
Effect of certain cover crops, and flowering plant strips on pathogenicity and inoculum production of *Plasmodiophora brassicae* and *Sclerotinia sclerotiorum*

Nazanin Zamani-Noor, Sinja Brand, Hans-Peter Söchting

16th International Rapeseed Congress (IRC) 2023; Sydney, Australia

Rapeseed cultivation in Germany

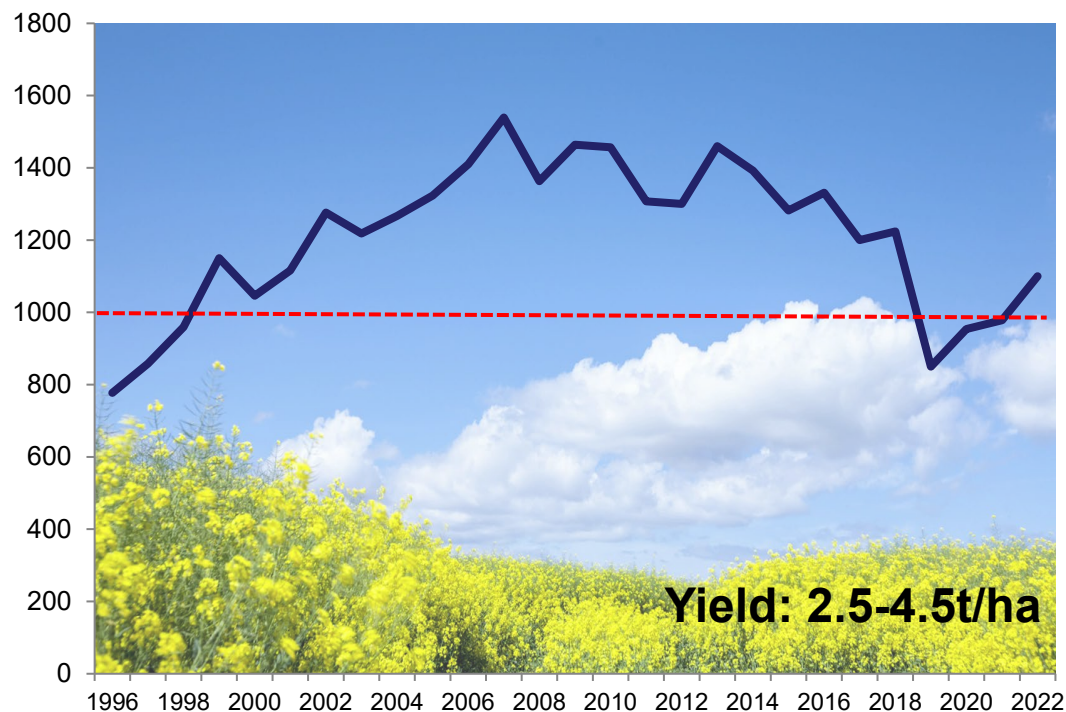
Acreage in 1000 ha



Quelle: <http://www.bmel-statistik.de/service/archiv/statistisches-jahrbuch/>

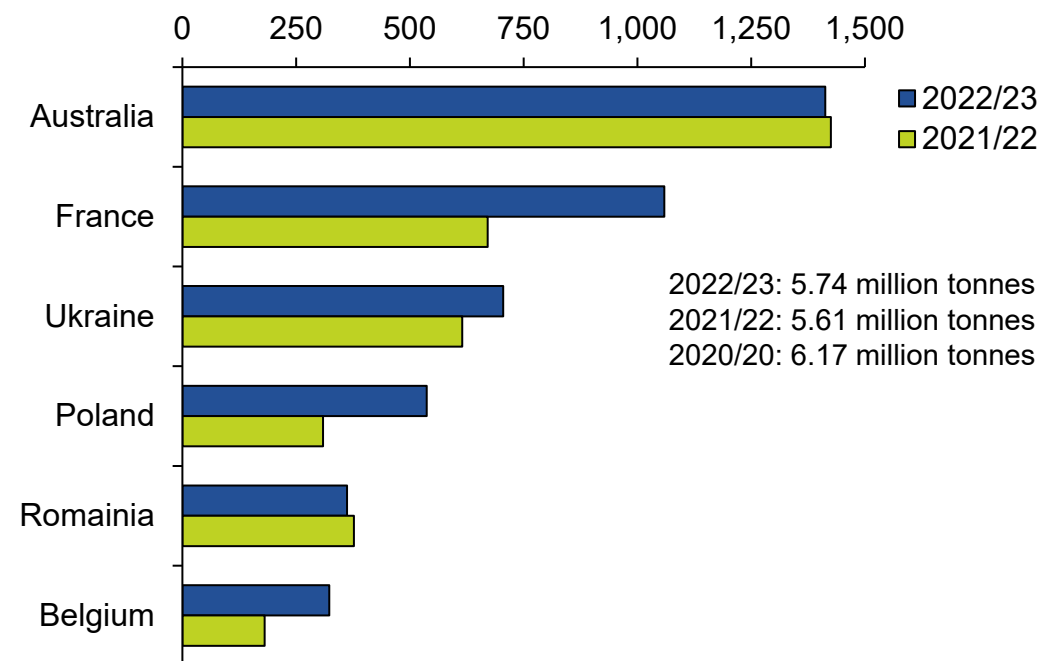
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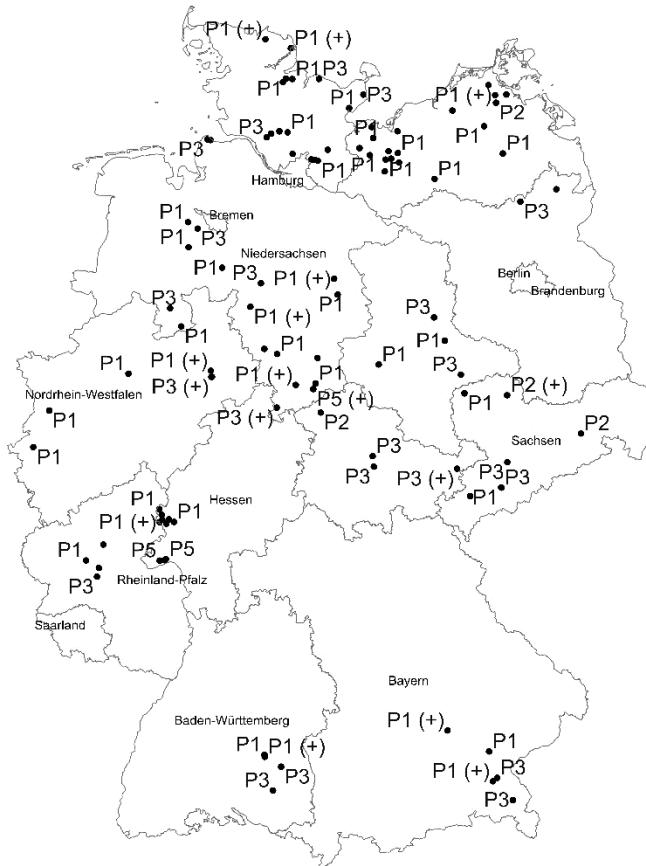
German rapeseed import by marketing years, in 1,000 tonnes



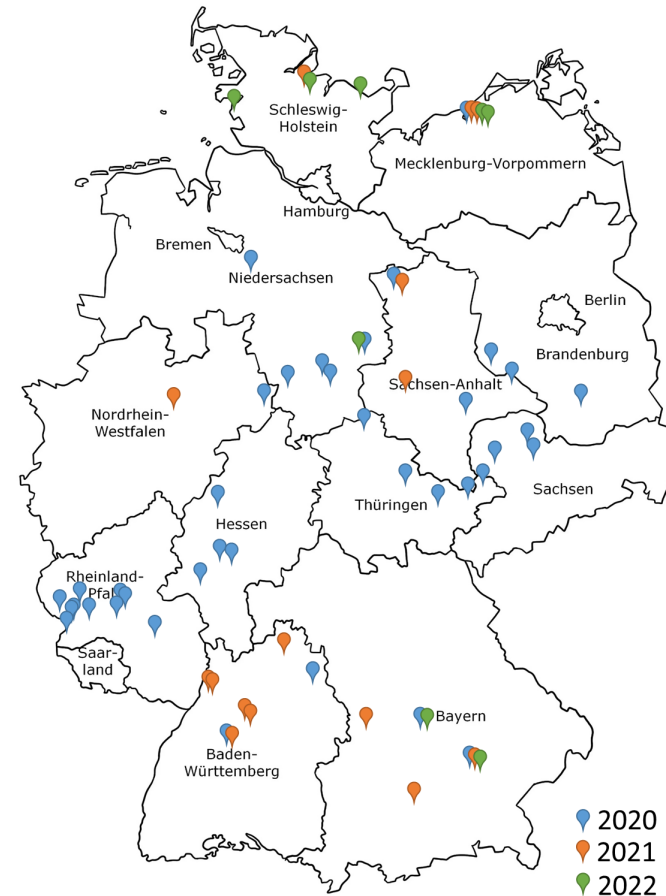
Source: Destati; UFOP 2023

Geographical distribution of PLADB and SCLESC in Germany

P. brassicae (2013-22; n=108)



S. sclerotiorum (2020-22; n=64)



- Zamani-Noor, N. 2017. **Plant Pathology** 66: 316-324
- Zamani-Noor, N., et al. 2022. **Pathogens** 11 (12): 1440

- Zamani-Noor, N., et al. **Plant Disease** (on progress)

EU: Common Agricultural Policy (CAP)

Aims:

- Reduce chemical plant protection products
- Push to increase species diversity on farmlands



European Green Deal:

more sustainable use of plant and soil natural resources

→ The 'green direct payment' (or 'greening') supports farmers who adopt or maintain farming practices that contribute to EU environmental and climate goals.

- In 2019/2020, cover crops occupied 1,974,000 hectares of German farmland, around 17% of all arable land
- When compared to the 2009/2010 period, the area allocated for cover crop cultivation experienced a notable increase of 66%



https://eu-cap-network.ec.europa.eu/common-agricultural-policy-overview_en

Disease reaction of different plant species against virulent isolates of *P. brassicae* and *S. sclerotiorum*

Objectives of current study:

- obtain a better understanding of the host-range potential of *P. brassicae* and *S. sclerotiorum* with different degrees of virulence
- the capacity of *P. brassicae* and *S. sclerotiorum* isolates to produce new resting spores or sclerotia in different host plants
- evaluation the range of asymptomatic plants capable of supporting the survival or reproduction of *P. brassicae* and *S. sclerotiorum*



Zamani-Noor, N., et al., 2022. **Plant Disease**, 106:57-64. <https://doi.org/10.1094/PDIS-02-21-0410-RE>

Zamani-Noor, N., et al., 2023. **Plant Disease** (under review)

Experimental design

- *S. sclerotiorum*:
 - SCLESC-6** (aggressive)
 - SCLESC-34** (low aggressive)
- Plant genotypes: **33 plant species from 11 botanical families**
(Apiaceae (n=1), Asteraceae (n=4), Boraginaceae (n=2), Brassicaceae (n=12), Chenopodiaceae (n=1), Fabaceae (n=6), Geraniaceae (n=1), Hypericaceae (n=1), Lamiaceae (n=1), Linaceae (n=1), Polygonaceae (n=2)).



6 dpi



- Relative stem/leaf lesion length (%)

21 dpi



- Nr. of produced sclerotia
- Weight of each sclerotia
- Effect of size of sclerotia on carpogenic germination and apothecia production

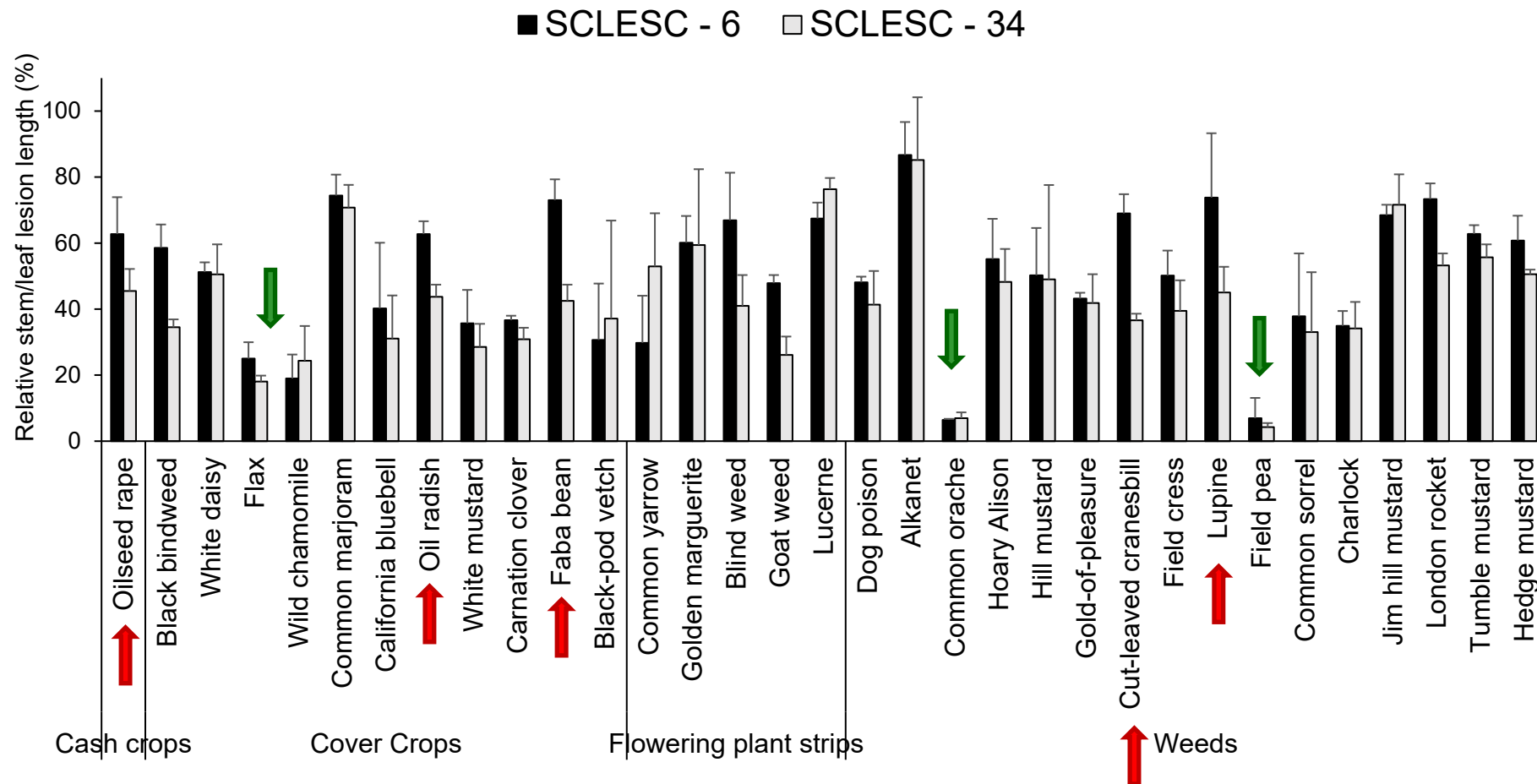
Results – Relative stem/leaf lesion length (%); 6 dpi



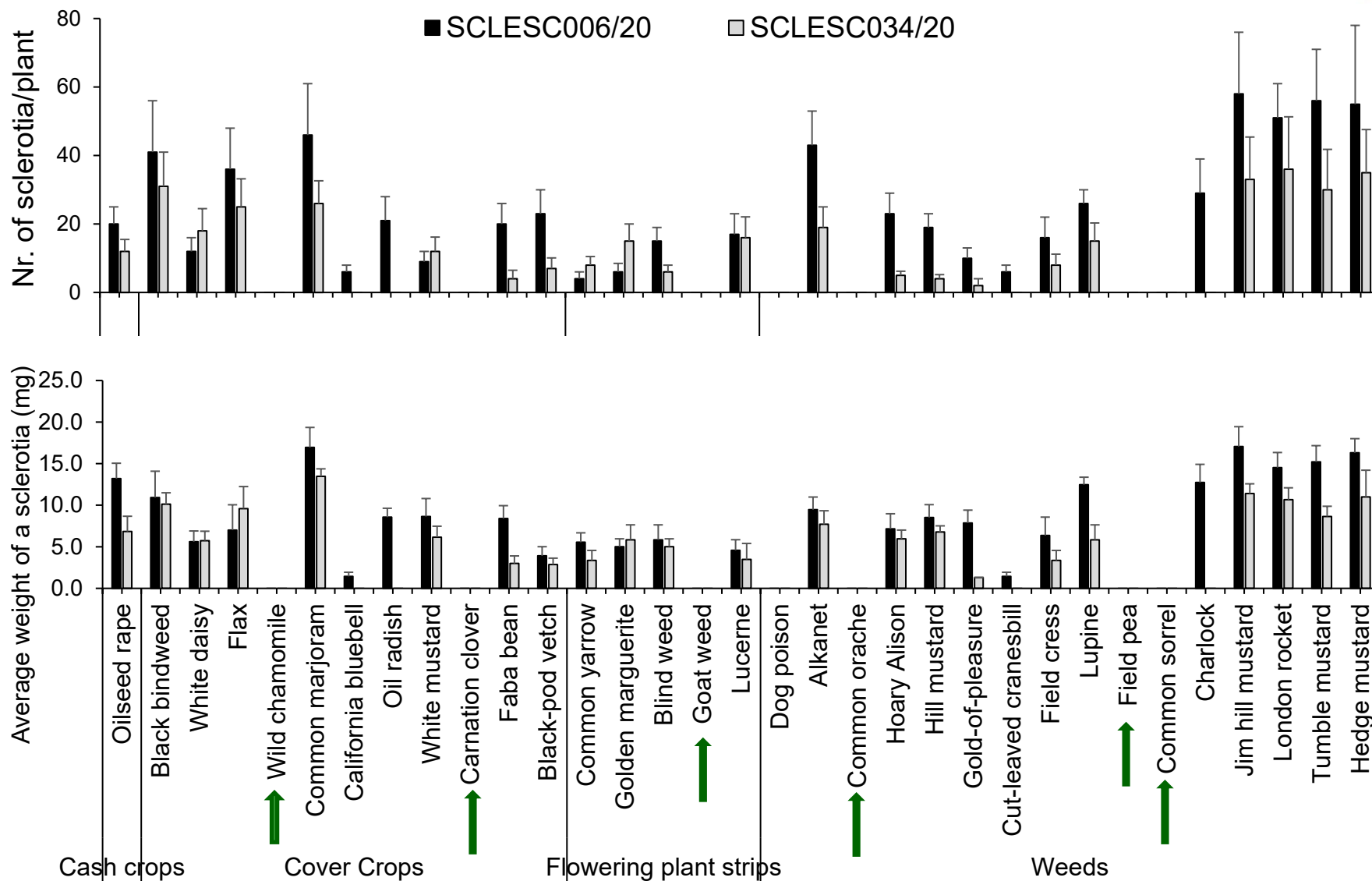
White mustard



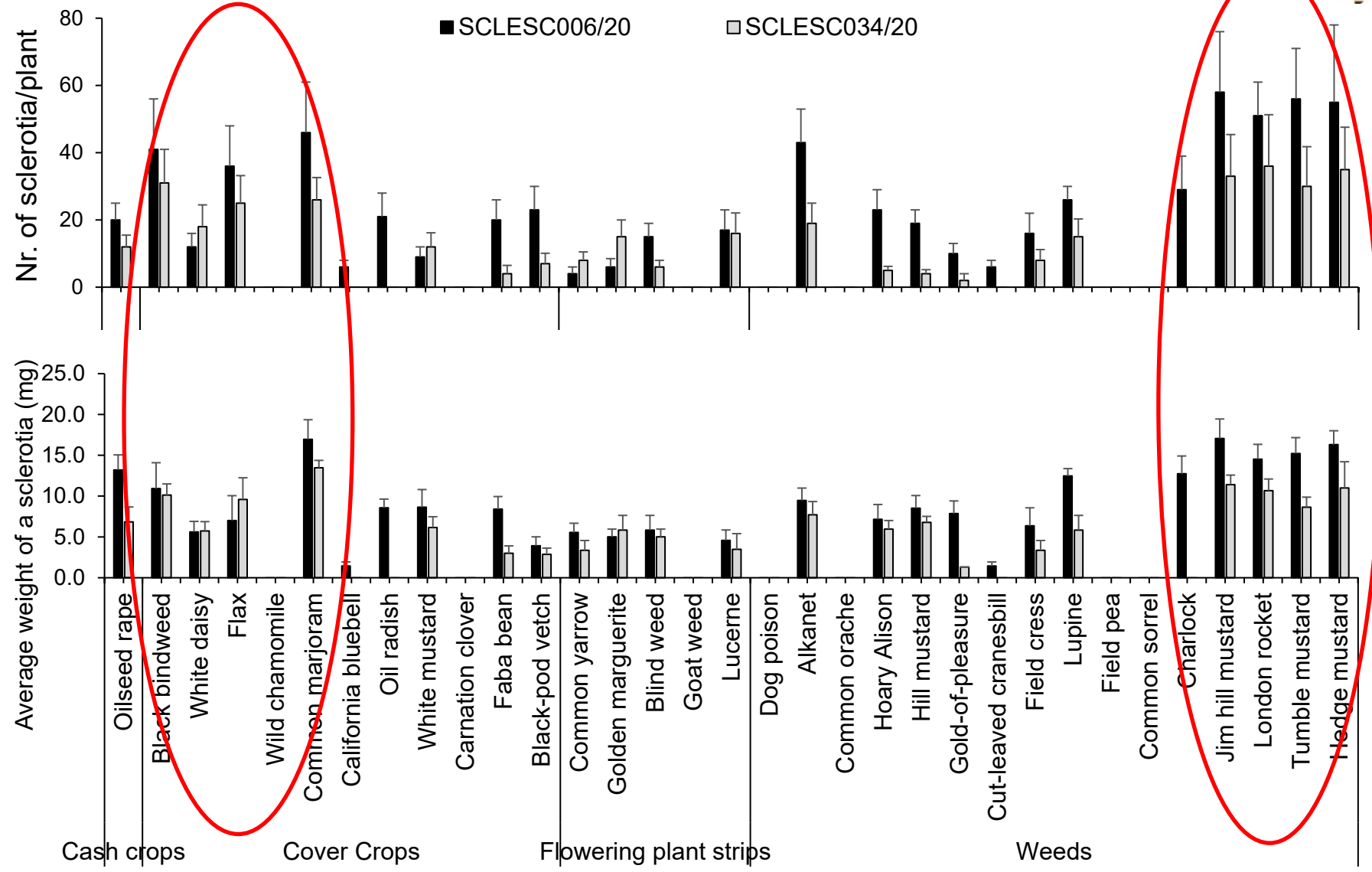
Faba bean



Results – Nr. and weight of produced sclerotia; 21 dpi

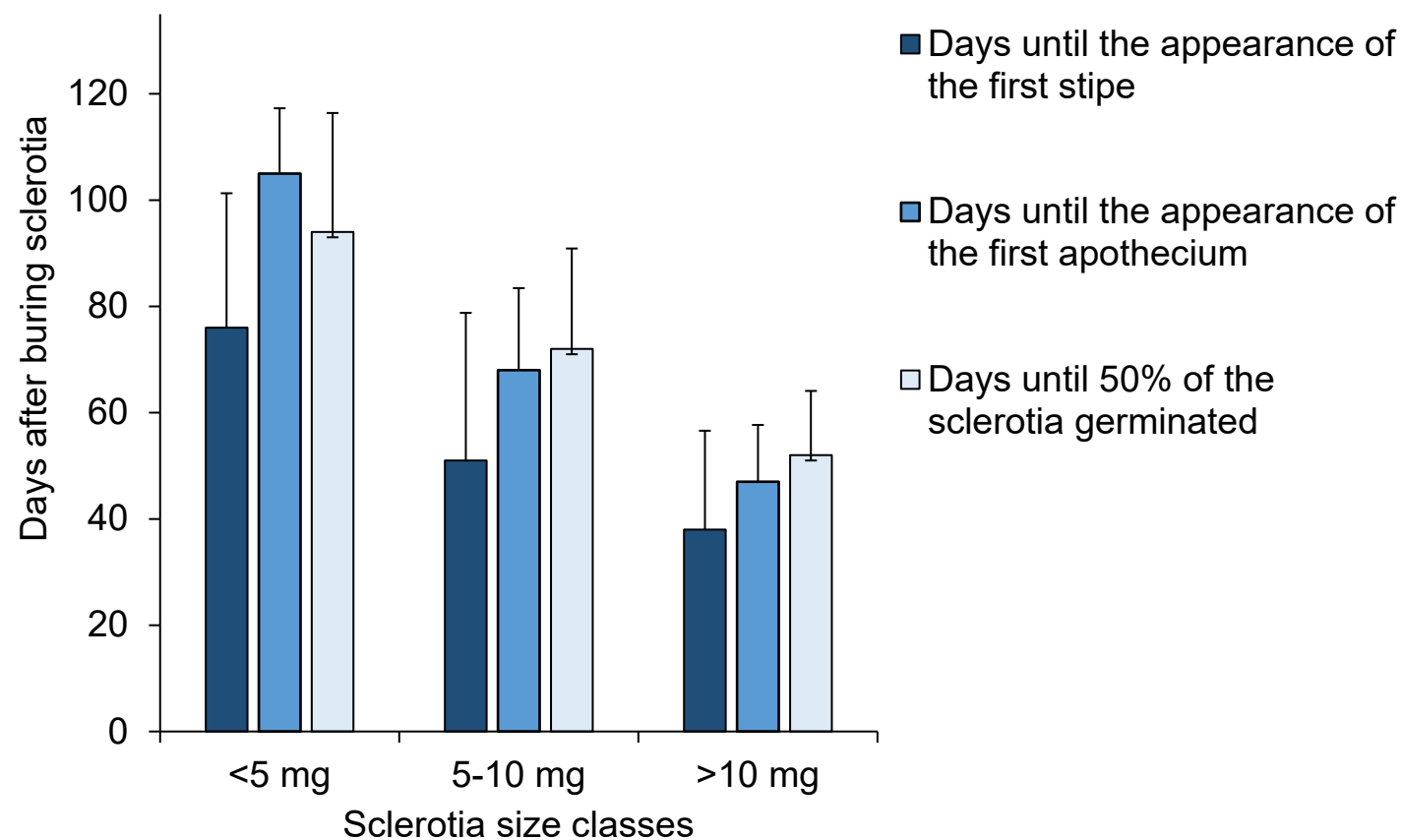


Results – No. and weight of produced sclerotia; 21 dpi



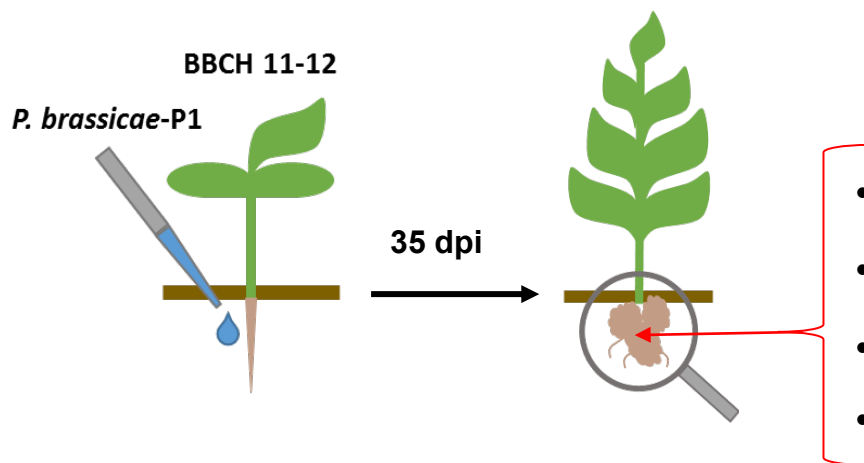
Results – Effect of size of sclerotia on carpogenic germination and apothecia production

Sclerotia were sorted into three size classes: light (<5 mg), average (5-10 mg), and heavy (>10 mg)



Experimental design _ Clubroot

- *P. brassicae*:
 - **P1** (virulent on cv. Visby; avirulent on cv. Mendel)
 - **P1(+)** (virulent on both OSR cultivars)
- Plant genotypes: **86 plant species from 19 botanical families**
(Amaranthaceae (n = 1), Asteraceae (n = 6), Boraginaceae (n = 1), Brassicaceae (n = 27), Caryophyllaceae (n = 1), Cyperaceae (n = 1), Euphorbiaceae (n = 1), Fabaceae (n = 11), Geraniaceae (n = 1), Lamiaceae (n = 1), Linaceae (n = 1), Papaveraceae (n = 2), Plantaginaceae (n = 1), Poaceae (n = 23), Polygonaceae (n = 1), Rosaceae (n = 2), Solanaceae (n = 3), Urticaceae (n = 1), Violaceae (n = 1))



Results – Disease symptoms

The visible clubroot symptom was observed only in taxa of the **Brassicaceae** family.



Tall rocket



Mustard



Flixweed



Camelina

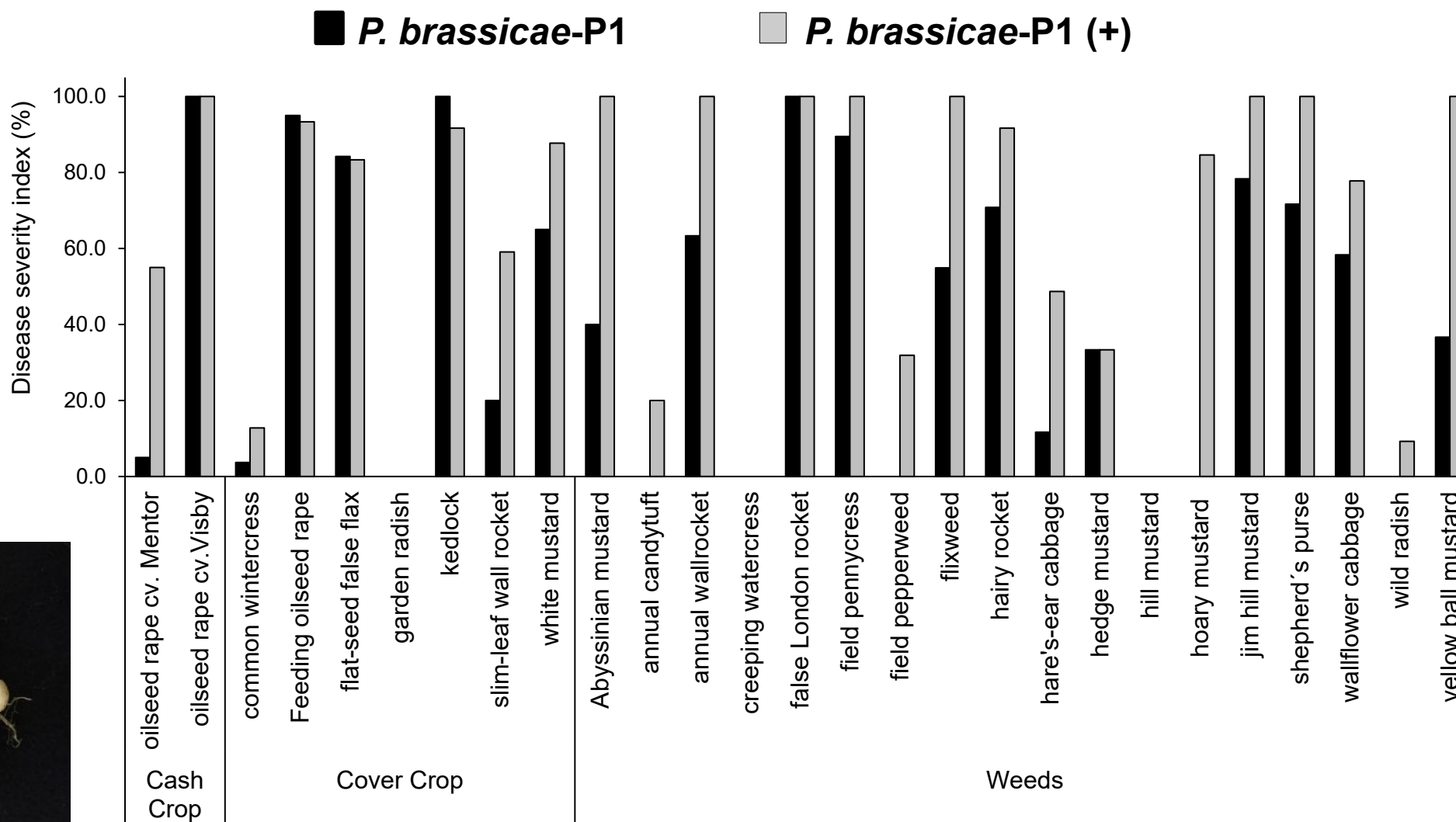


Capsella

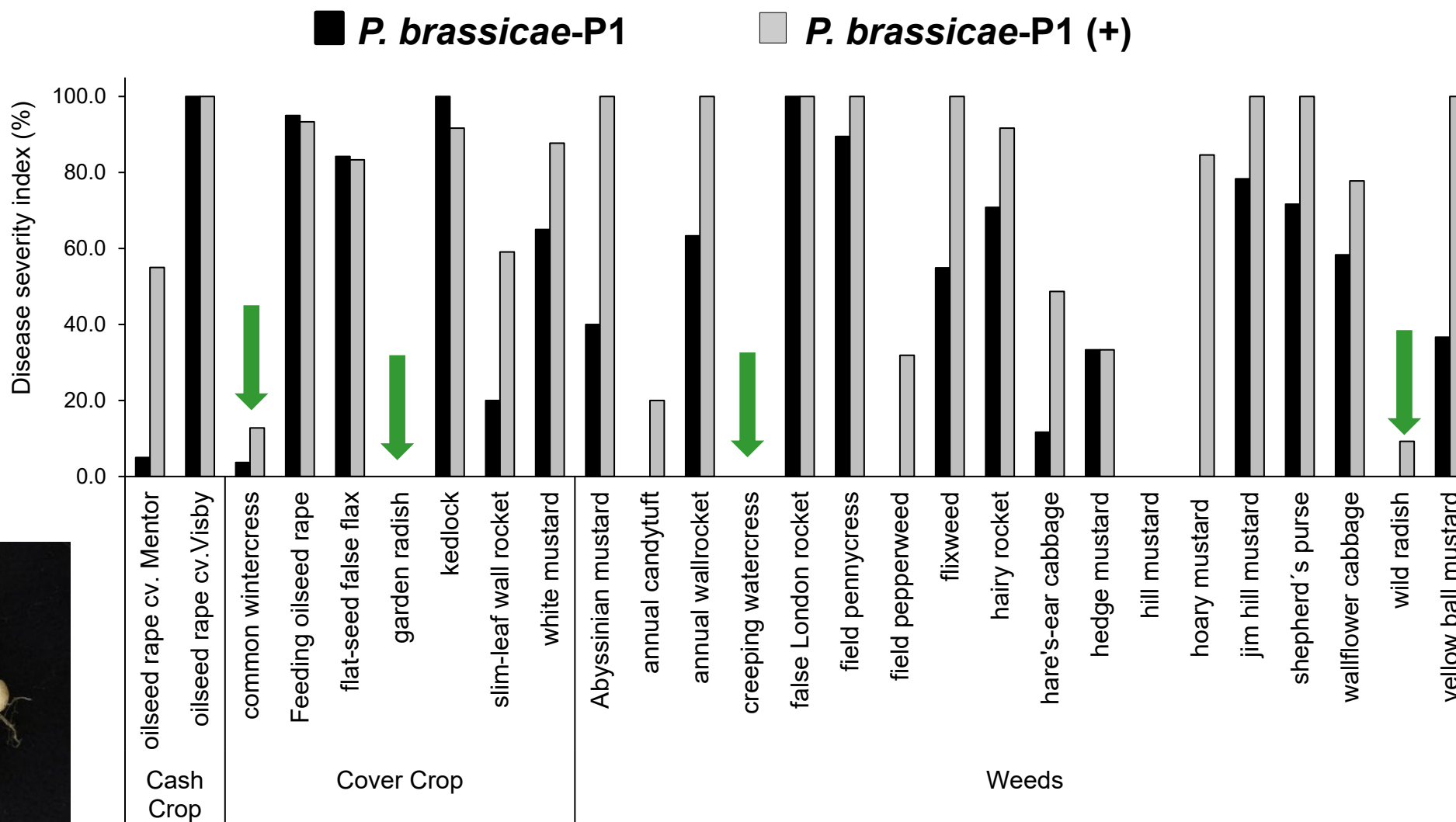


Small tumbleweed
mustard

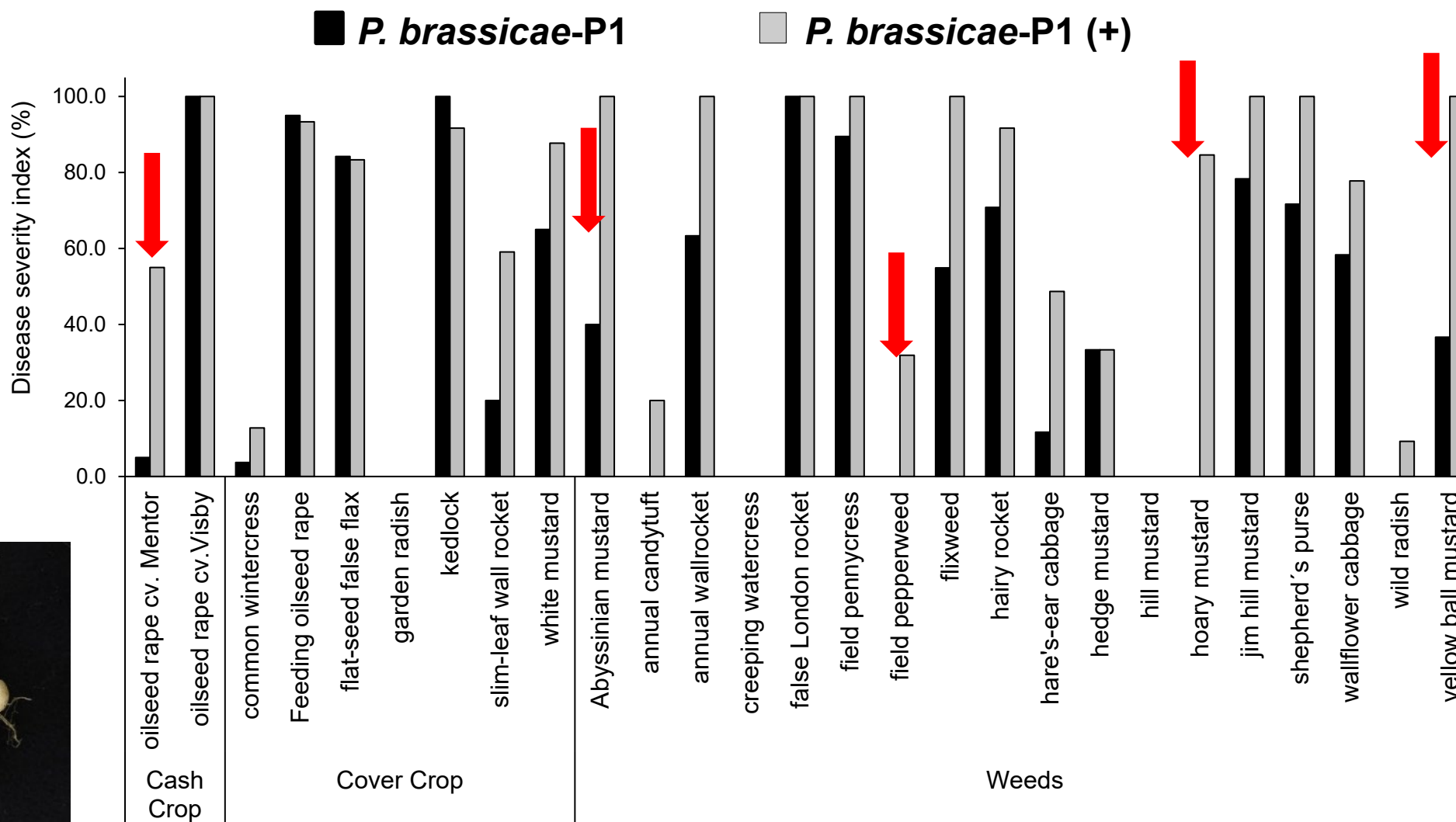
Results – Disease severity index



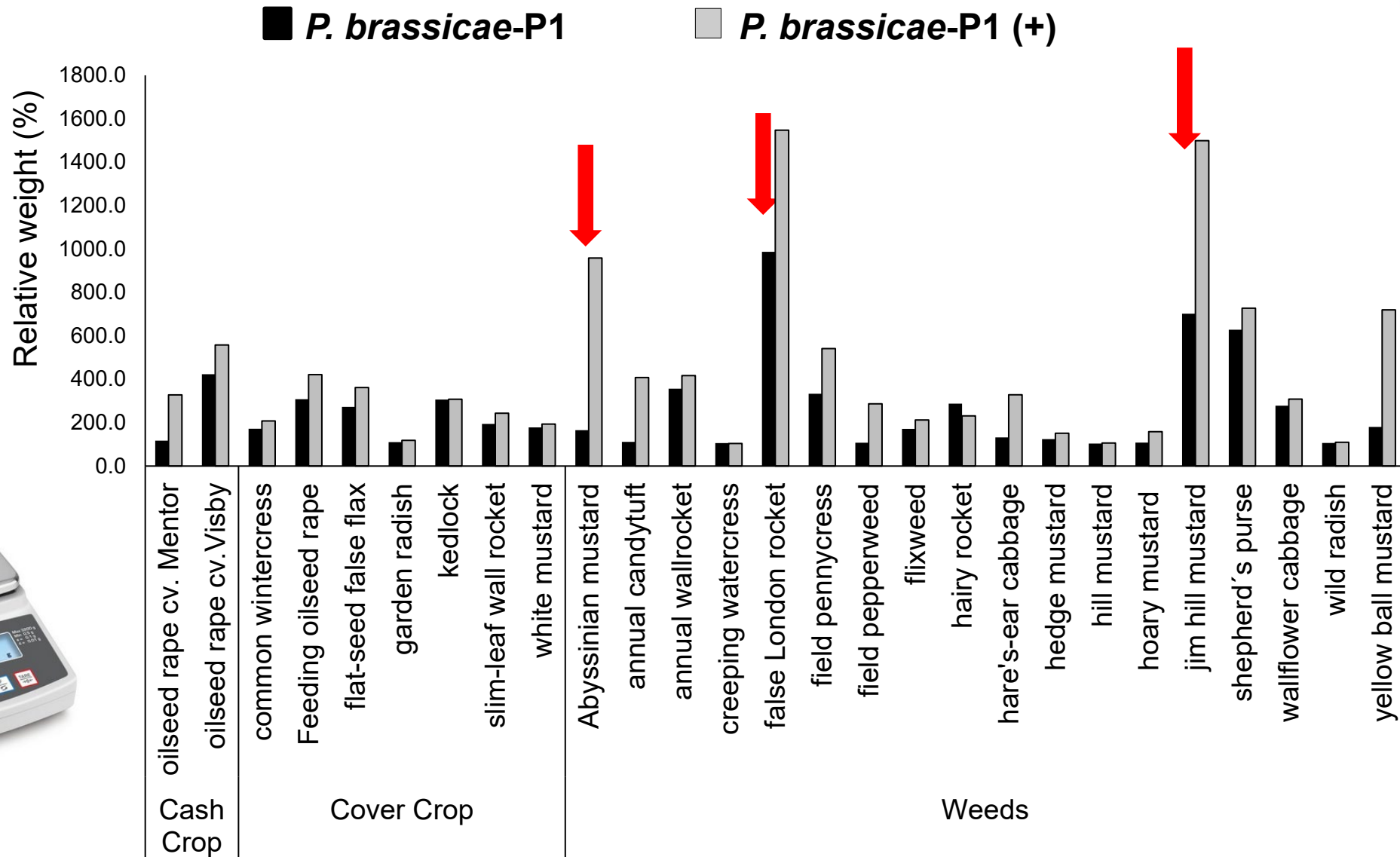
Results – Disease severity index



Results – Disease severity index



Results – Relative root weight in comparison with the control



Results – Nr. of resting spores per g root

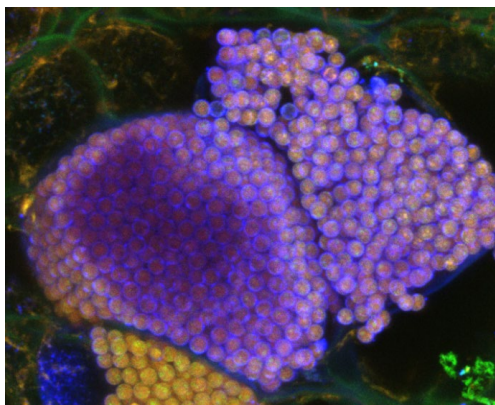
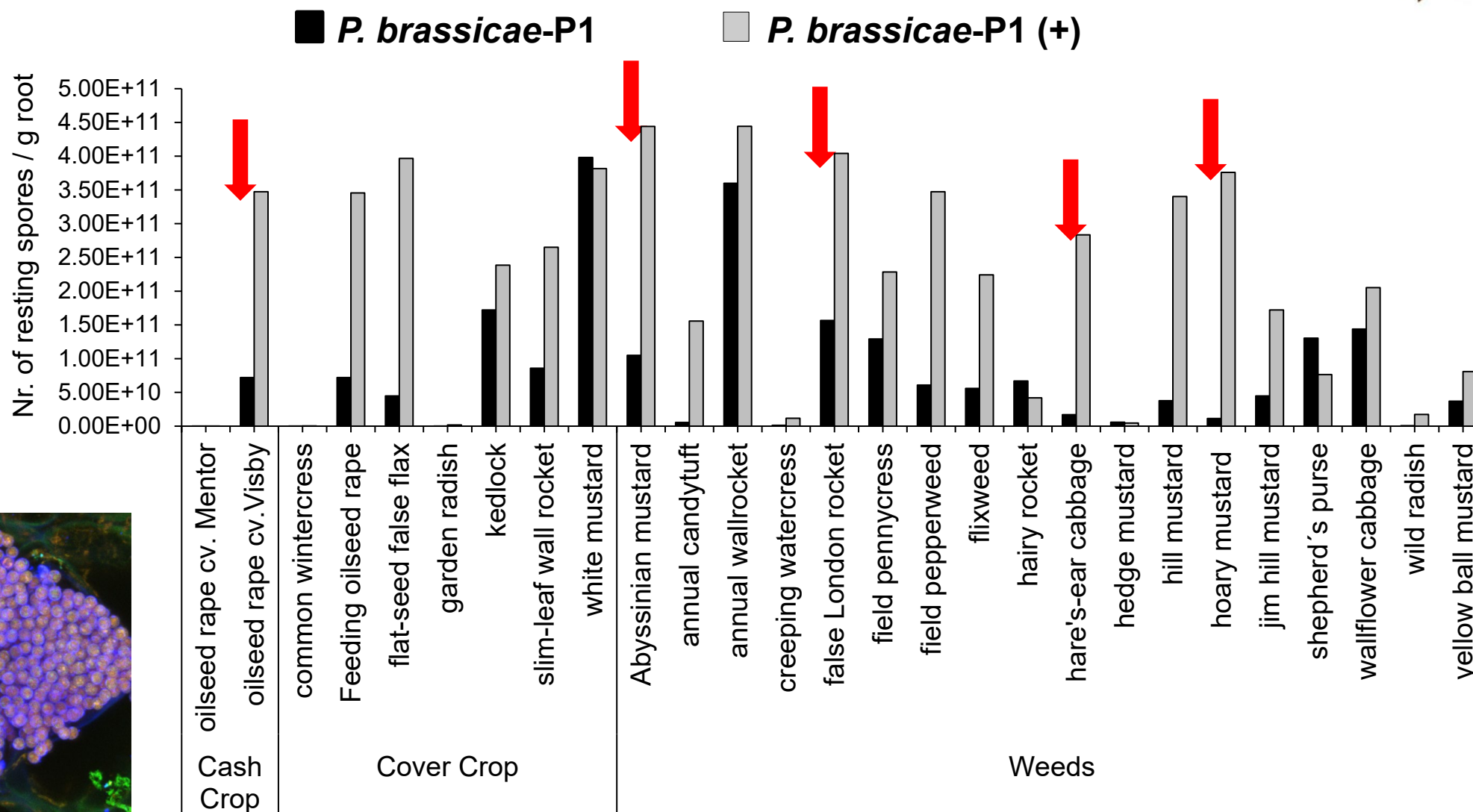


Photo: Yvonne Becker (JKI EP)



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(JKI Braunschweig)



Thank you for your attention