Evaluation of hoverfly (Diptera: Syrphidae) communities in contrasting agricultural landscapes using three different sampling methods

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Introduction:

- Hoverflies are key bioindicators, pollinators and biocontrol agents

- Few studies evaluating the efficacy of different sampling methods for hoverfly monitoring, in particular, focusing on landscapes with varying habitat complexity



- Crucial role of habitat and landscape structure in hoverfly occurrence and distribution

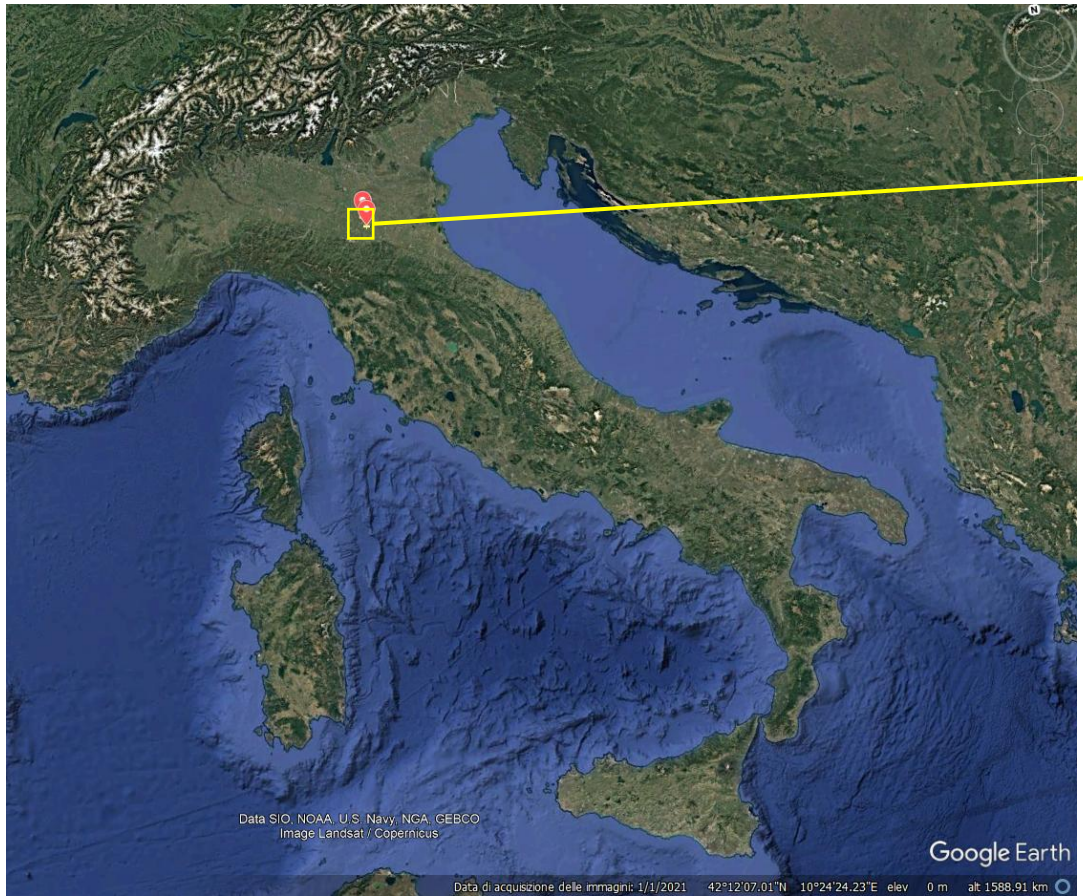
Objectives:

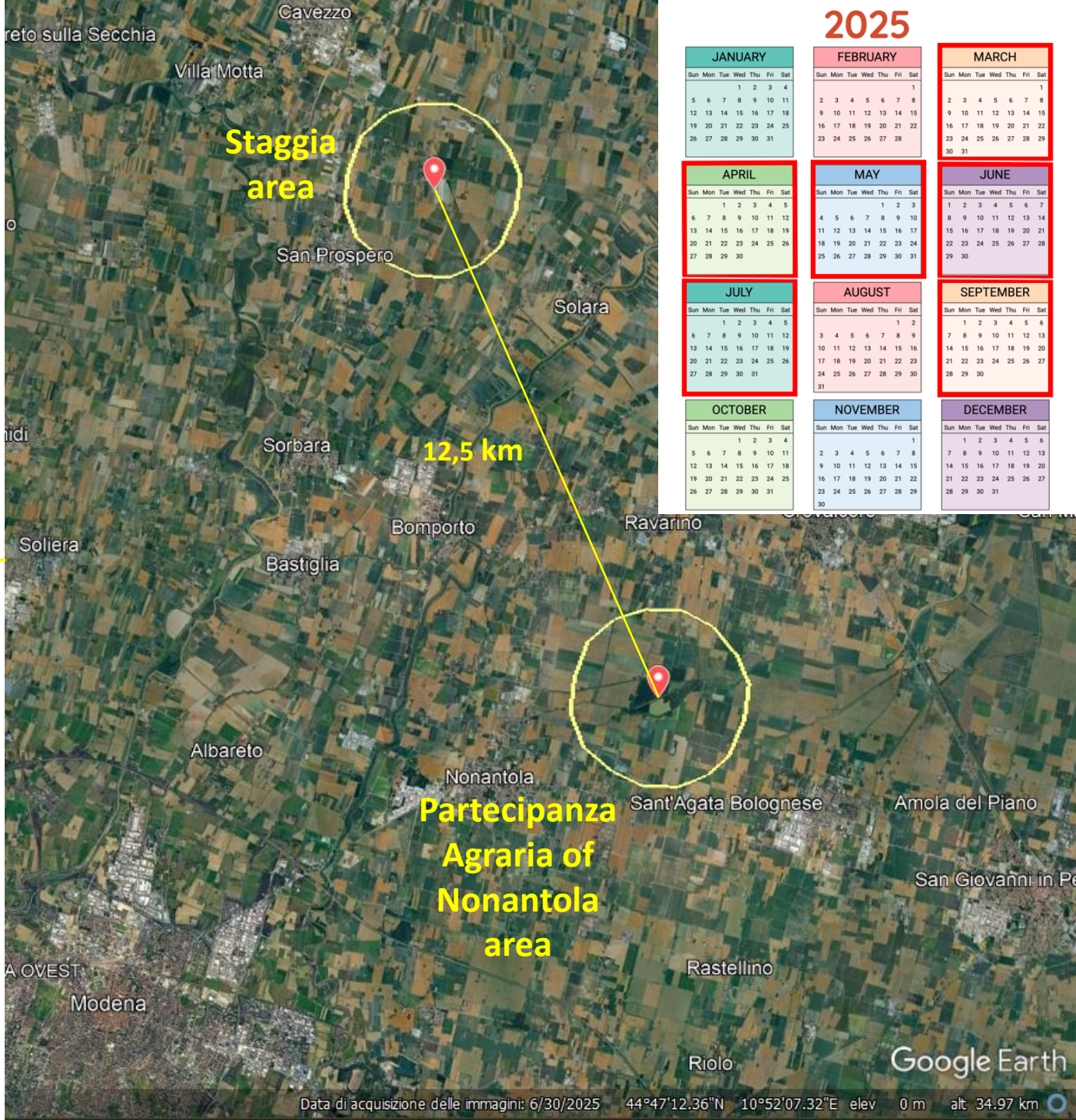
1. Evaluate the most **effective methodology** for providing a detailed assessment of hoverfly communities

2. Describe how **landscape complexity** influences hoverfly community structure in two different areas

Where and when:

- Northern Italy, Po Valley
- Modena Province
- **Partecipanza Agraria of Nonantola** and **Staggia** (near San Prospero)

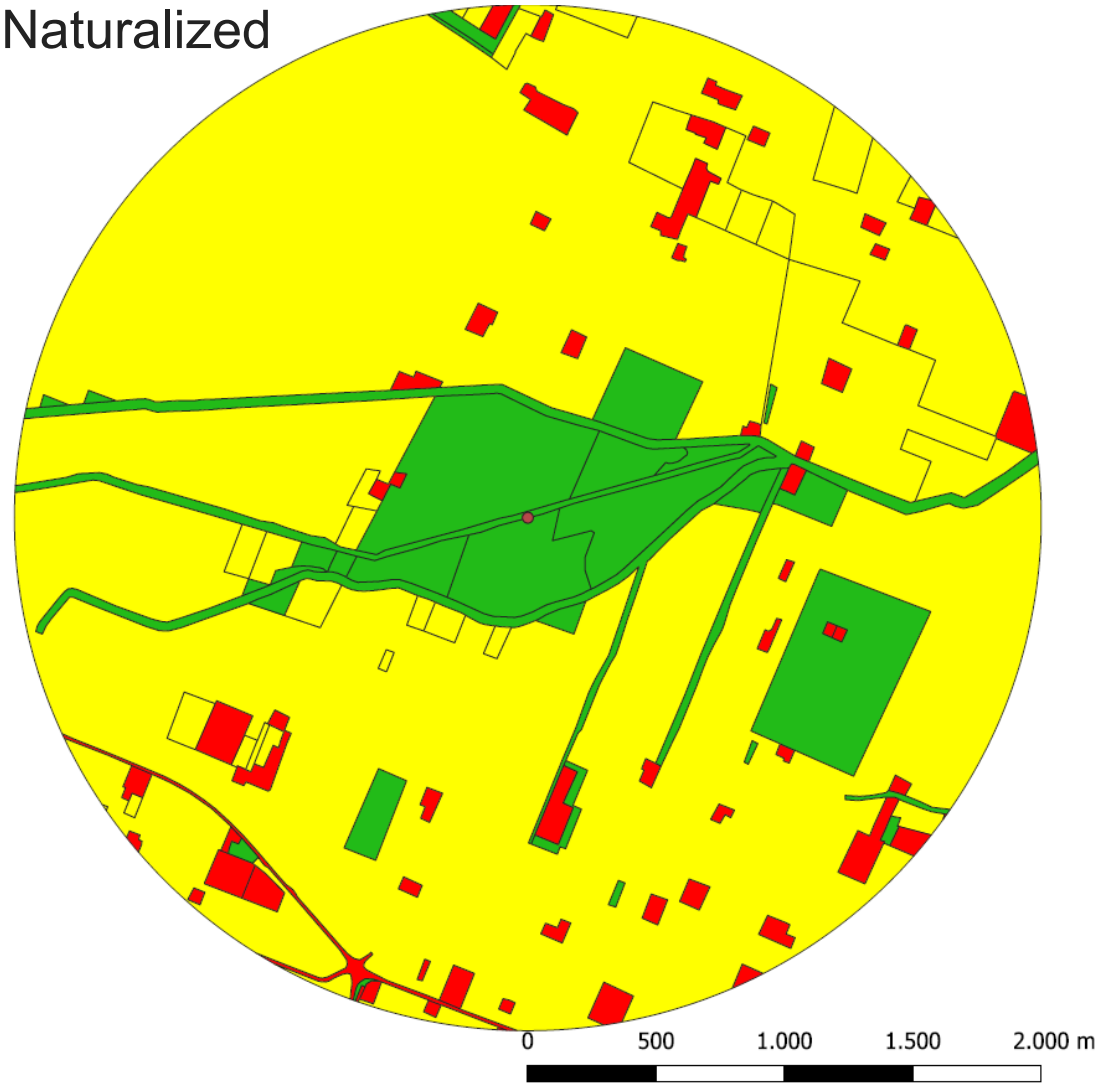




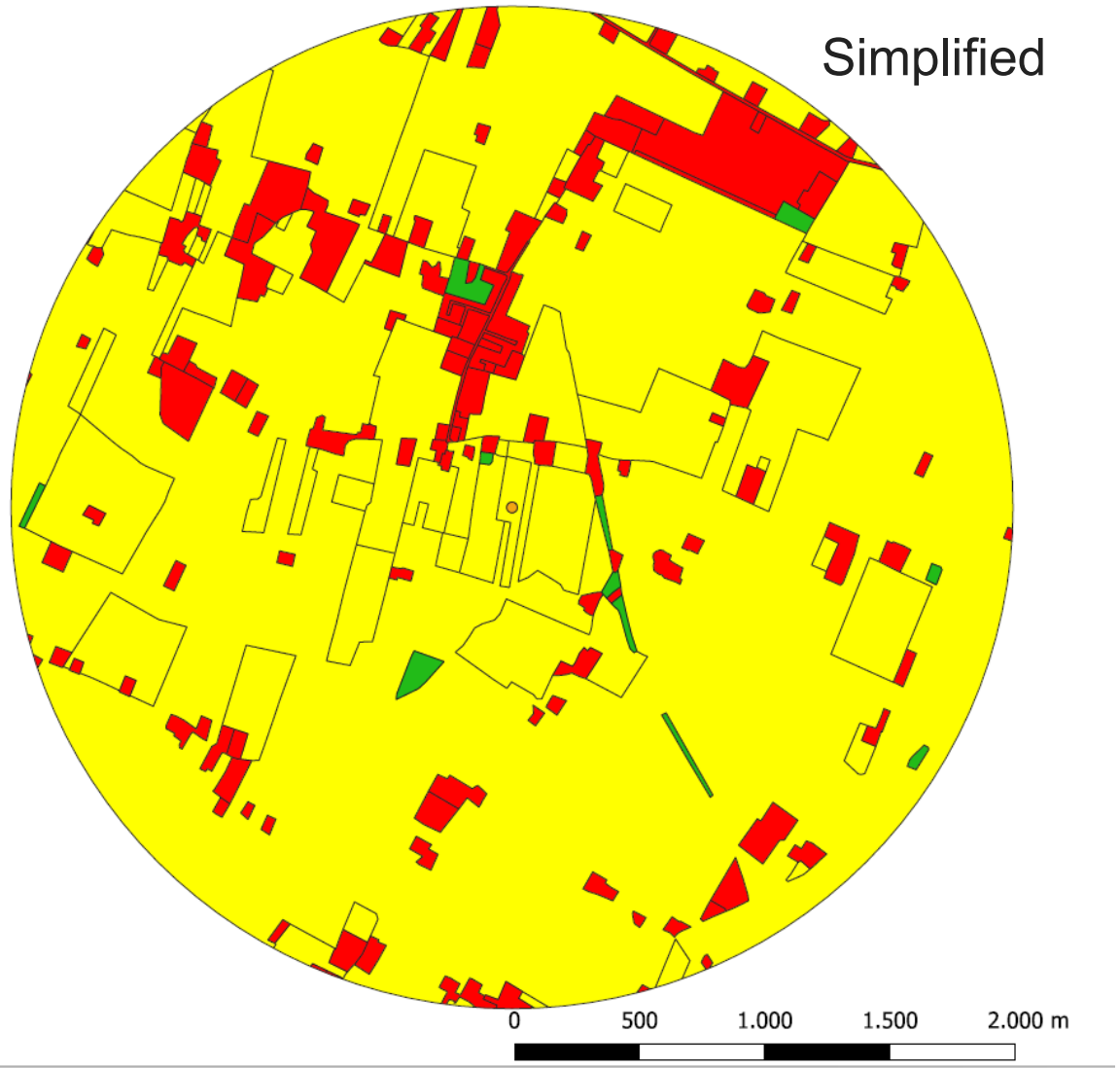
Use of soil in Partecipanza and Staggia (buffer 2000m)

81,4%	Agricultural areas	89,0%
14,5%	Areas with significant natural spaces	0,6%
4,1%	Residential, industrial, commercial and public service areas	10,4%

Naturalized



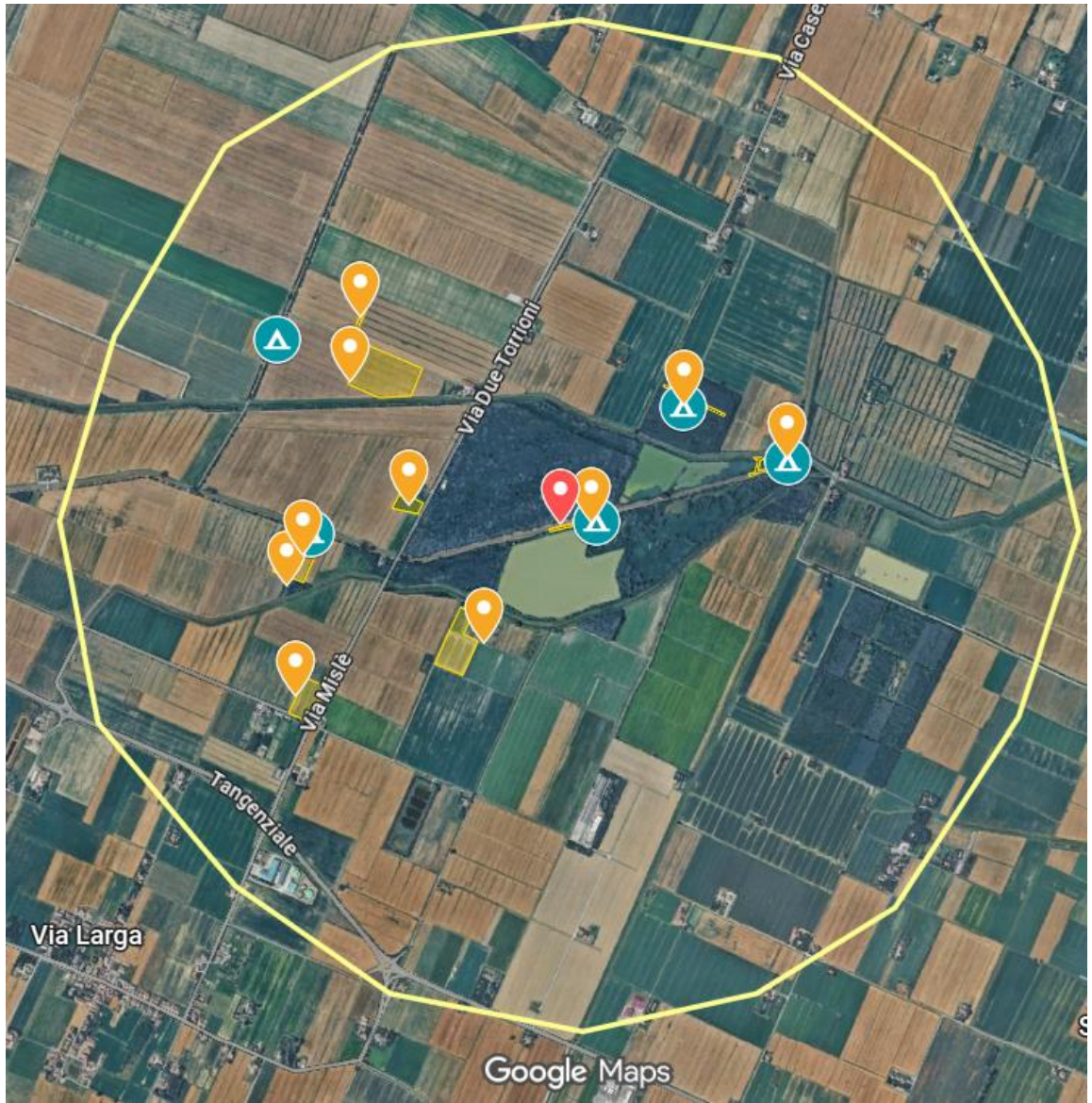
Simplified



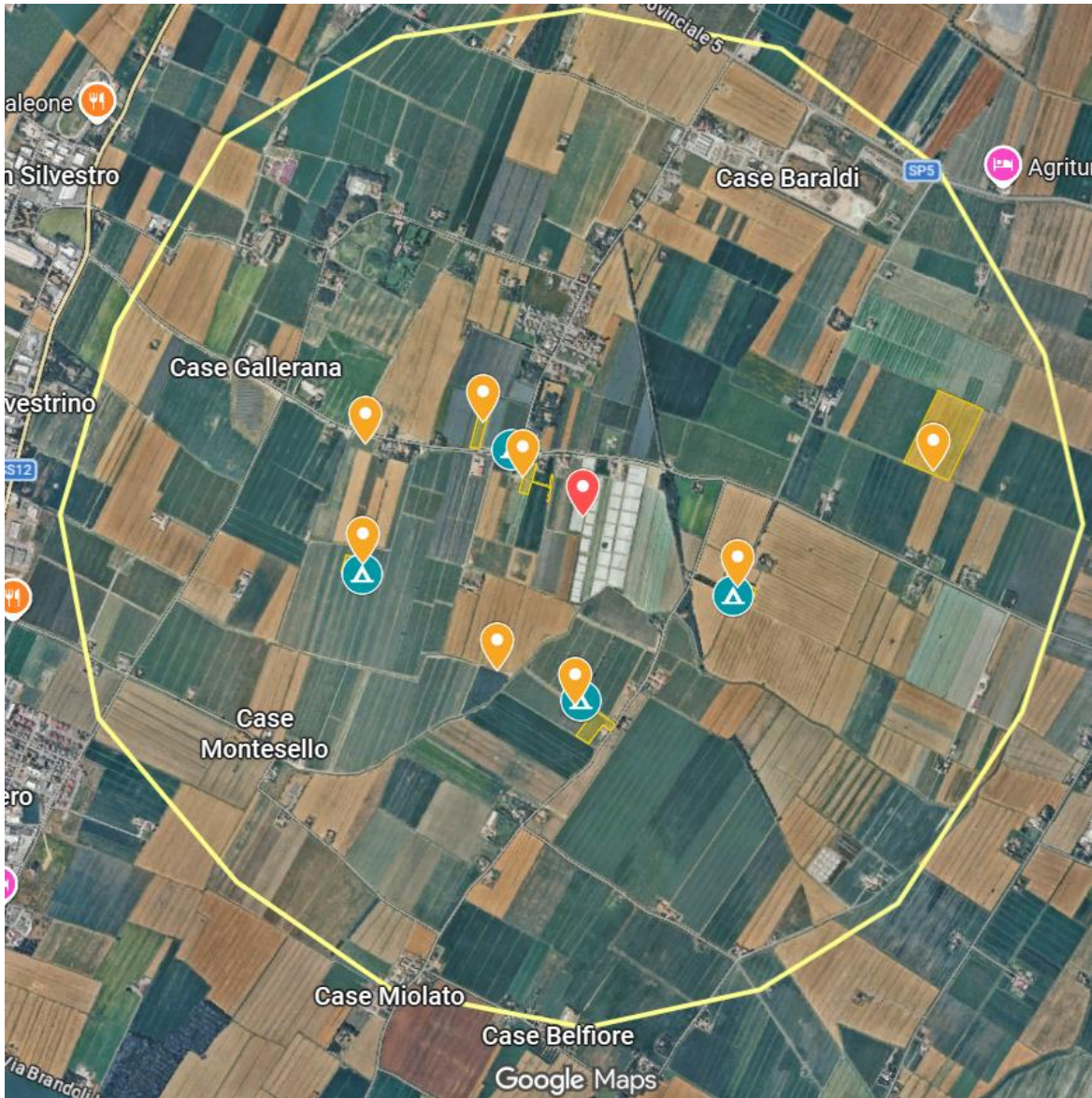
N. sampling sites

5	Malaise trap	4
8	Entomological net	6
10	Pan traps	8

Partecipanza (Naturalized)



Staggia (Simplified)



Matherial and methods: sampling methods

MALAISE TRAP

- 15 days/month of sampling for each site



PAN TRAPS

- 1 day/month of sampling, from sunrise to sunset, for each site



ENTOMOLOGICAL NET

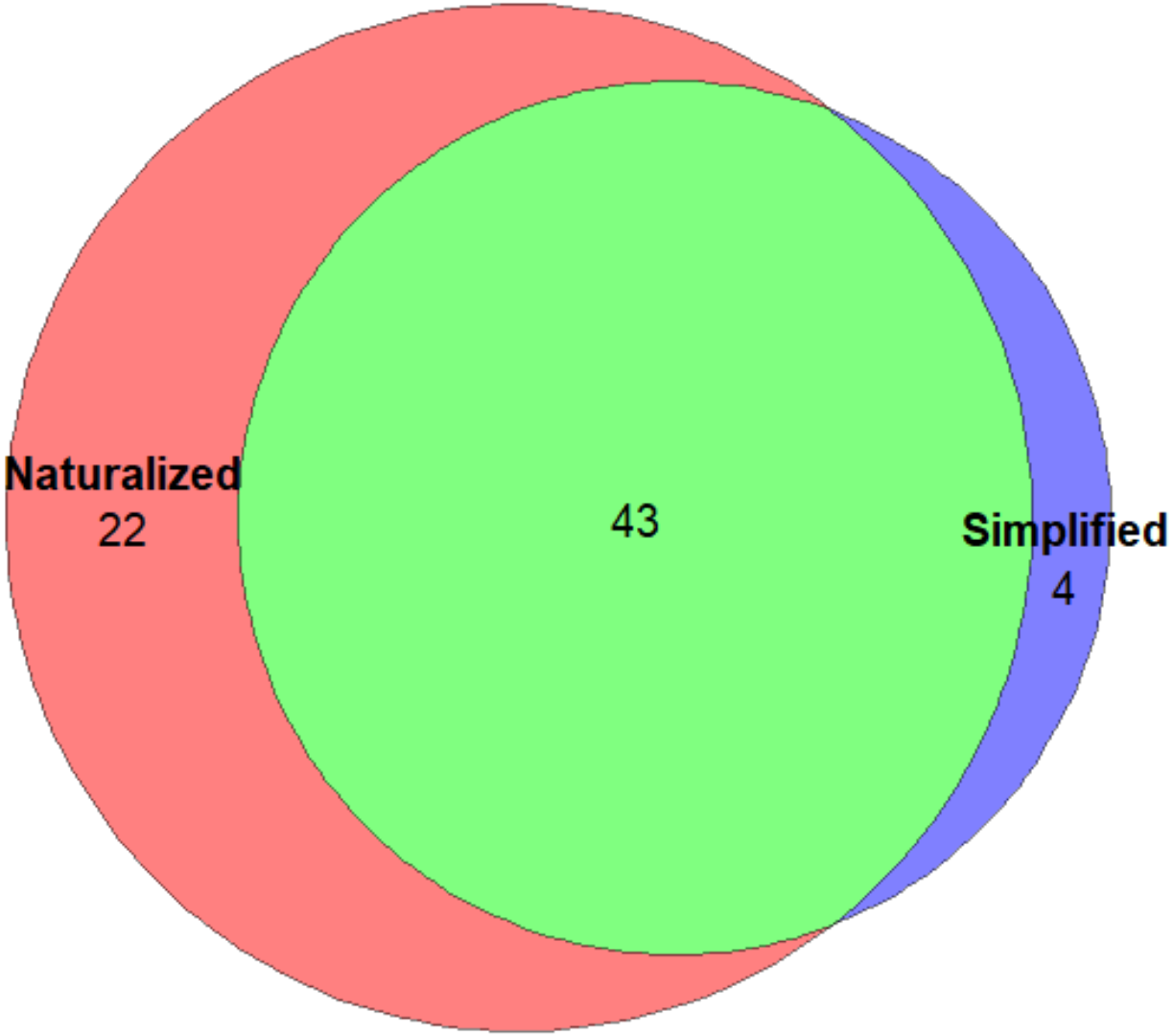
- 1 day/month of sampling for each transect (1 h/transect)



✓ In the same area only one sampling method was activated at the same time

Number of species recorded

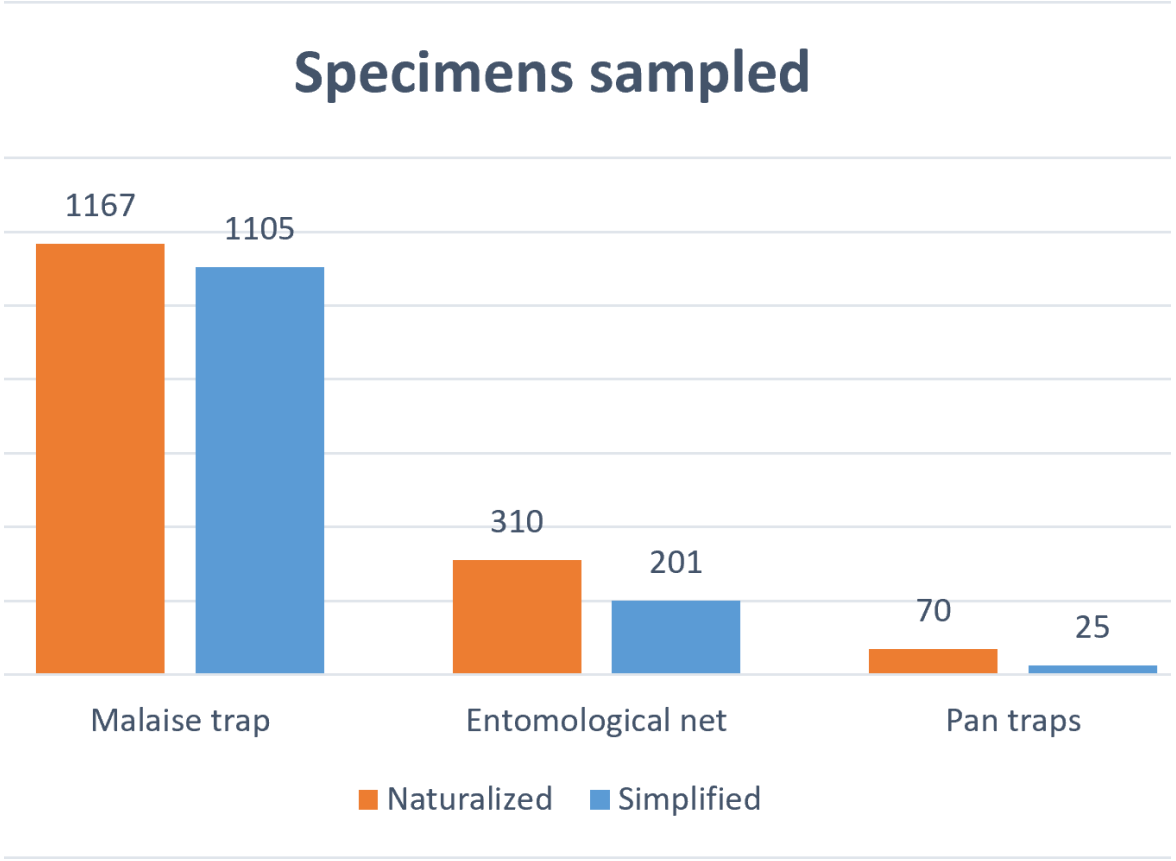
- Total: **69** species
- Naturalized: **65** species
- Simplified: **47** species

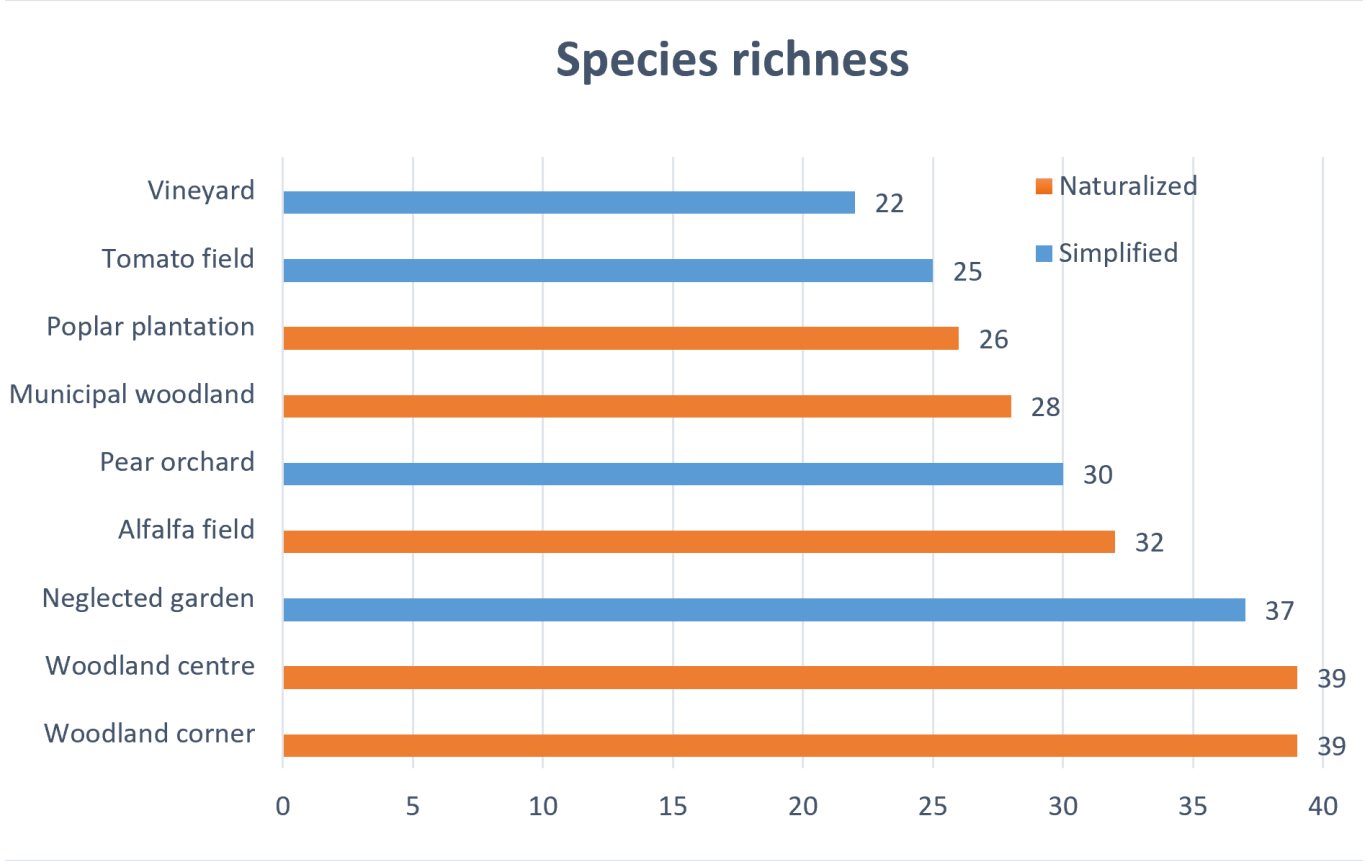


Number of specimens sampled:

- Total: **2885** individuals
- Naturalized : **1554** individuals
- Simplified: **1331** individuals

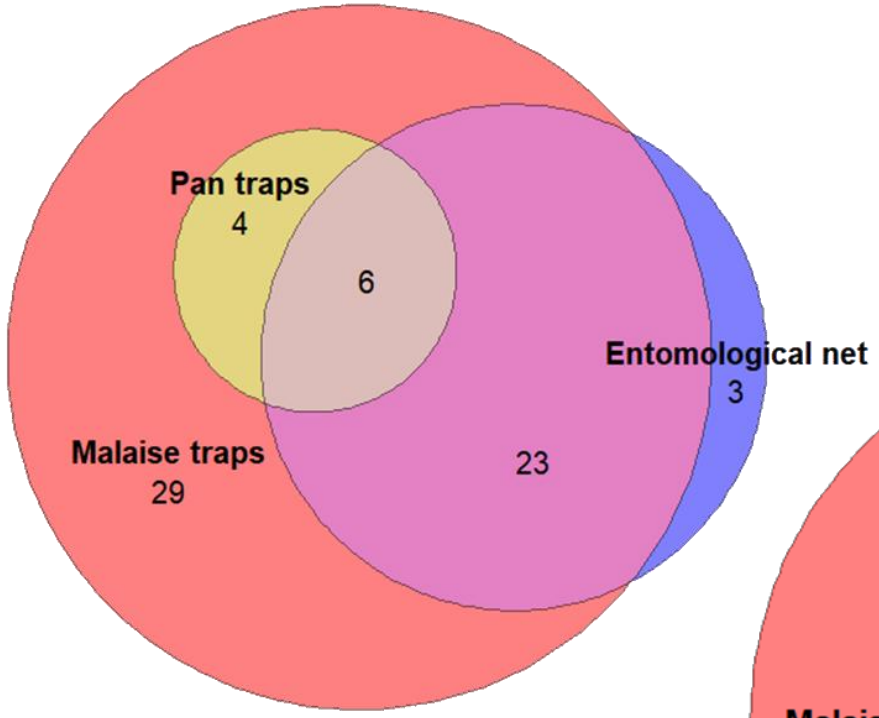
Overview: specimens collected and species richness





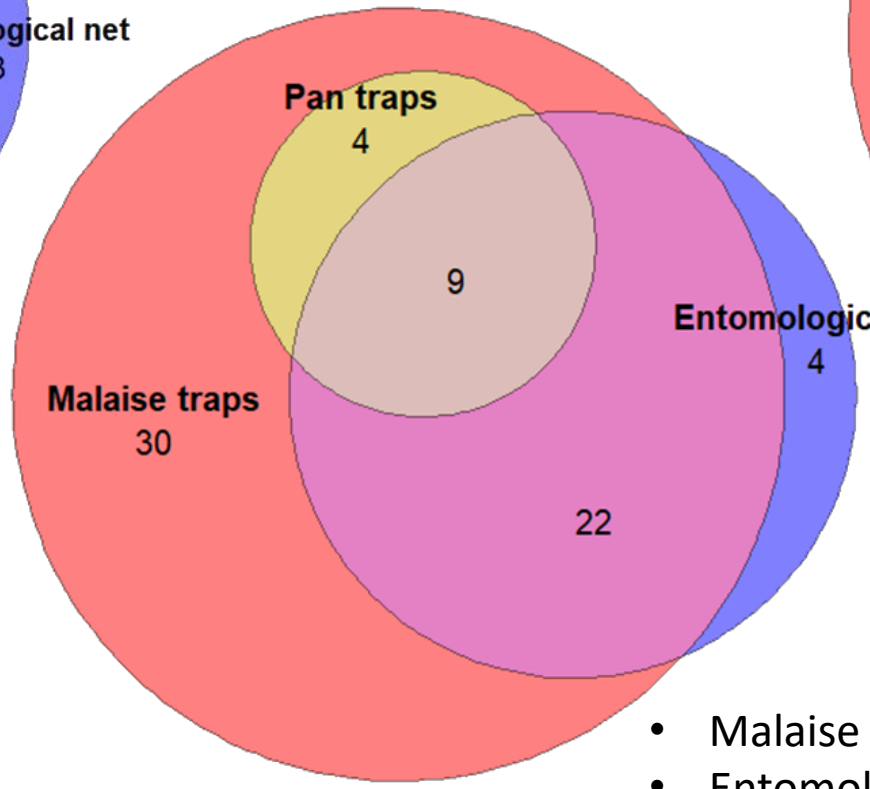
Number of species sampled with different methods

Naturalized



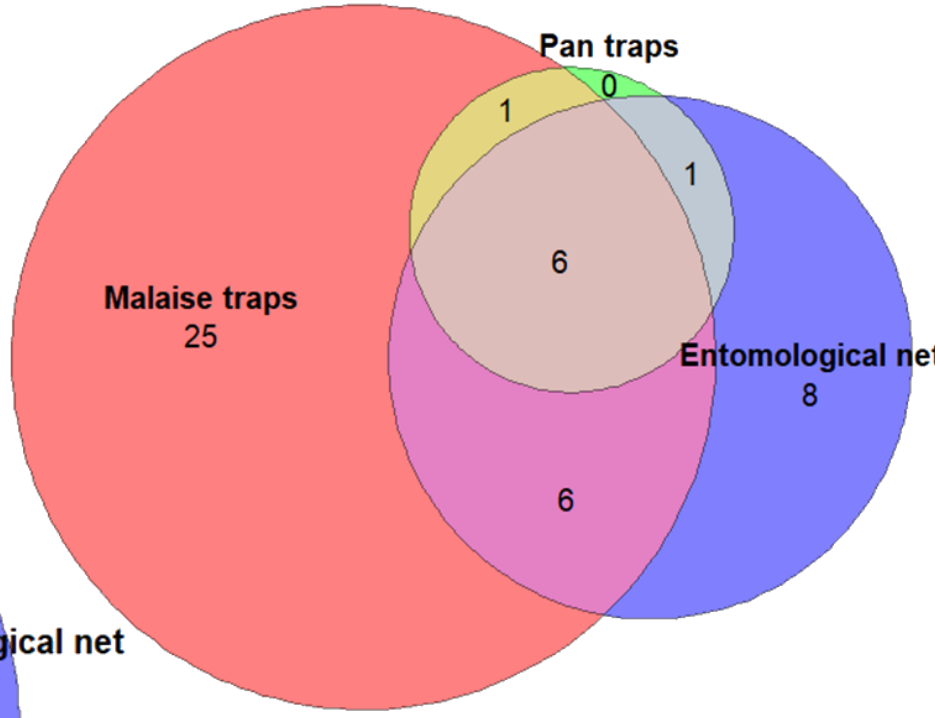
- Malaise traps: **62**
- Entomological net: **32**
- Pan traps: **10**

Naturalized + Simplified



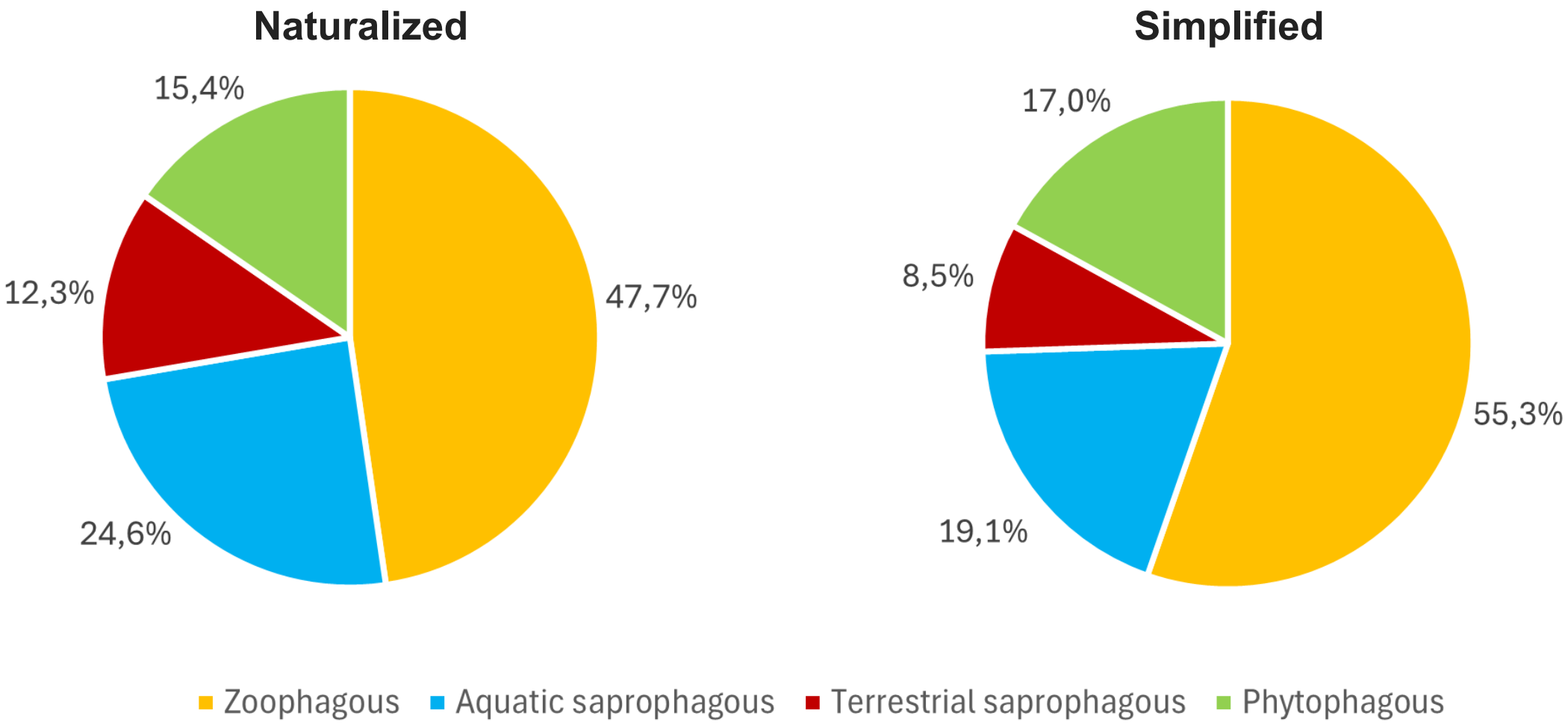
- Malaise traps: **65**
- Entomological net: **35**
- Pan traps: **13**

Simplified

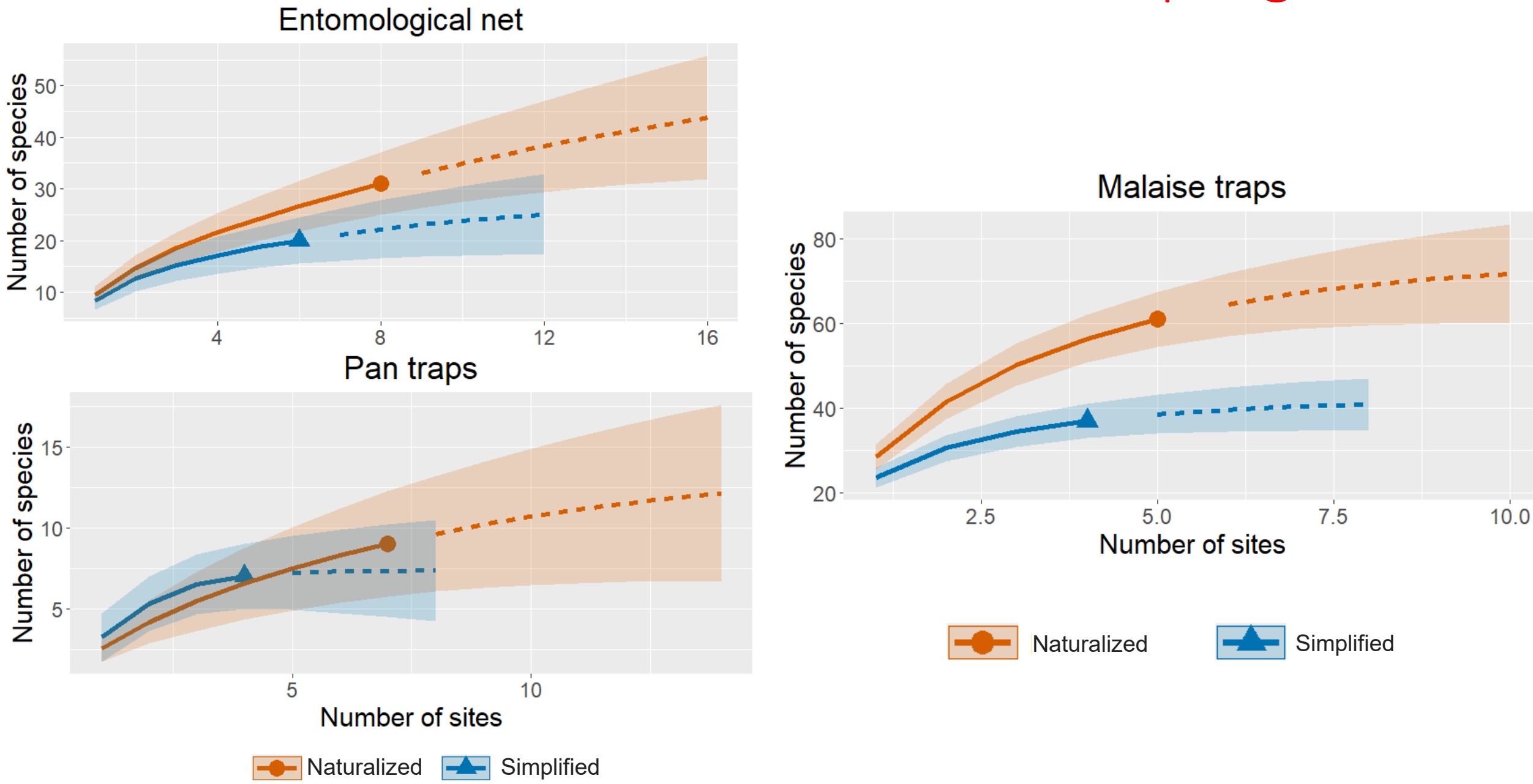


- Malaise traps: **38**
- Entomological net: **21**
- Pan traps: **8**

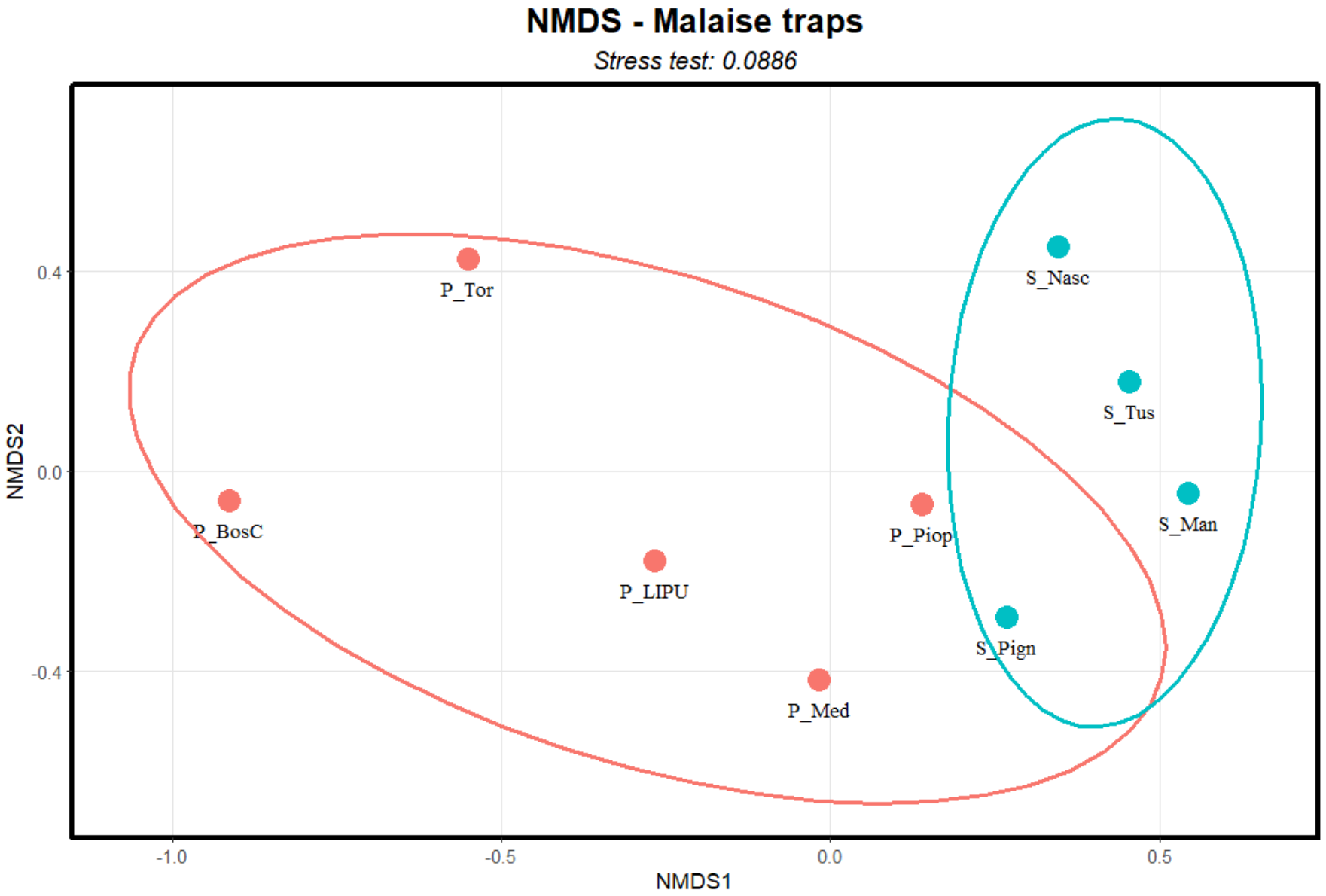
Larval diet of hoverflies sampled



Rarefaction curves sampled-based for sampling method



NMDS analysis and Permanova



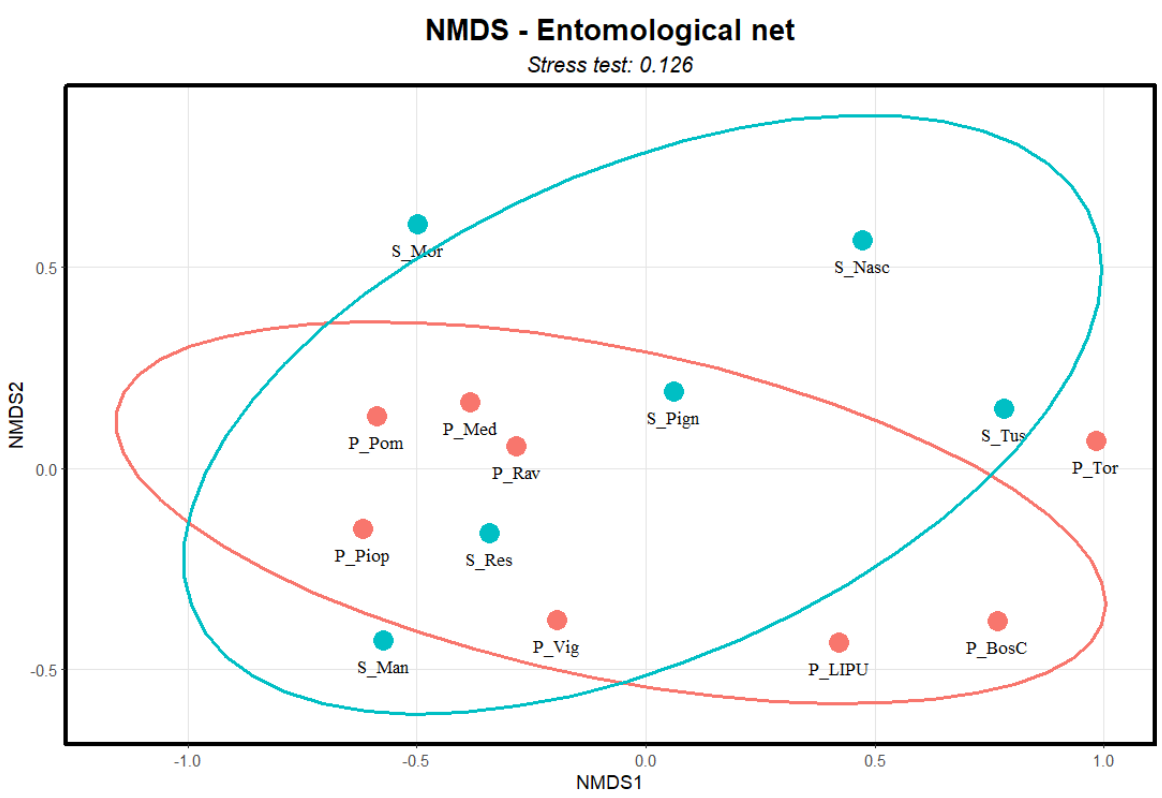
NMDS stress test: 0.0886

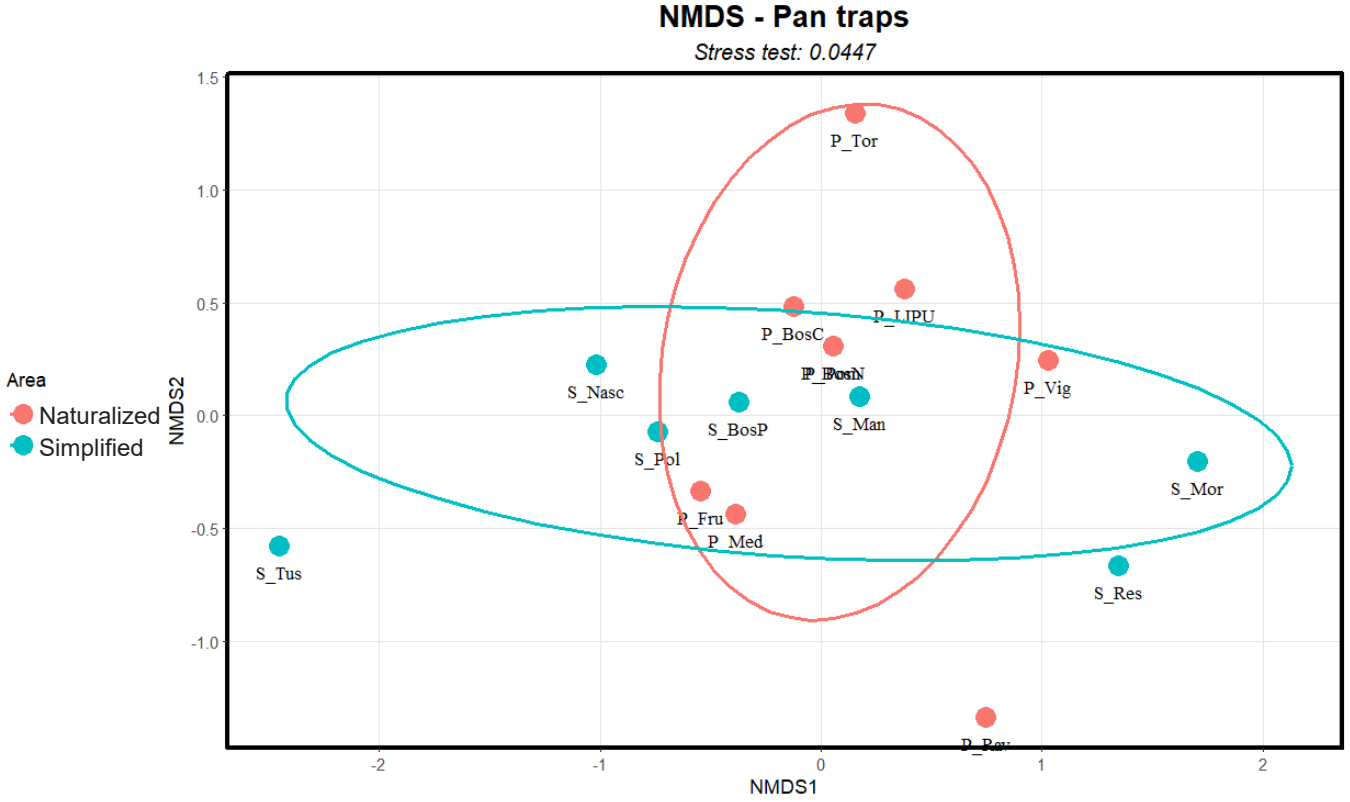
Permanova test:

R^2 = 0.30389; p = 0.022 *

Betadisper test: p = 0.236

NMDS analysis and Permanova





NMDS stress test: 0.126

Permanova test:

R^2 = 0.05406; p = 0.676

Betadisper test: p = 0.706

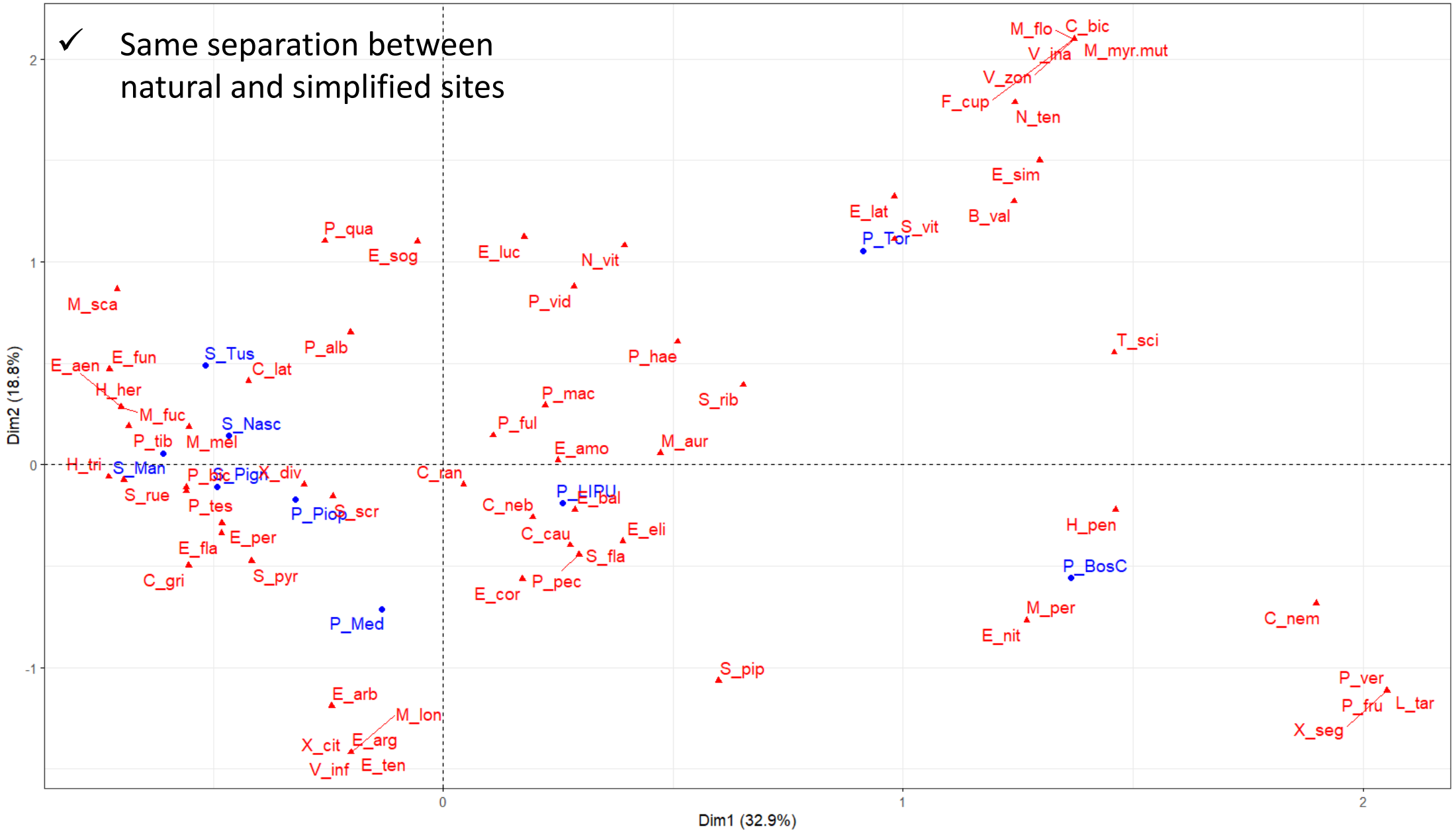
NMDS stress test: 0.0447

Permanova test:

R^2 = 0.07236; p = 0.39

Betadisper test: p = 0.52

Correspondence Analysis: Malaise traps



Conclusion

- **Malaise trap** → most efficient sampling method (94,2% species)
- **Pan traps** → are inadequate for an accurate characterization of the hoverfly community (18,8% species)
- Strong correlation with **small-scale landscape**
  - 22 out of 65 species were exclusive to the Naturalized area
  - 37 species were recorded in the neglected garden site (Simplified area)
- *Mallota fuciformis* (Fabricius, 1794) → recorded in the neglected garden site



Thank you for your attention!



