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Parasitoid communities in the understory of a forest in Poland vary with canopy species composition but show limited responses to herbivore-induced volatile emissions of oak saplings

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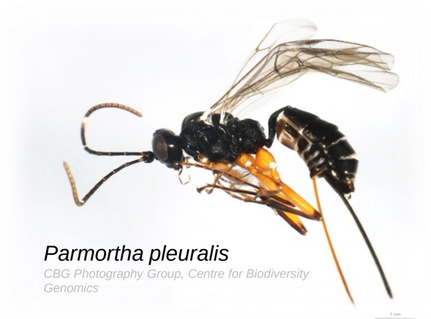
INTRODUCTION & AIM

Herbivore-induced plant volatiles attract natural enemies, including parasitoid wasps[1,2].

Which volatiles (VOCs) do induced oaks emit?[5,6]

VOCs attract parasitoids in forest understory?[3]

Effect of canopy composition on parasitoid communities?[3,7]



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CBG Photography Group, Centre for Biodiversity Genomics

METHODS

Puszcza Zielonka forest in Western Poland

Quercus robur & Q. petraea

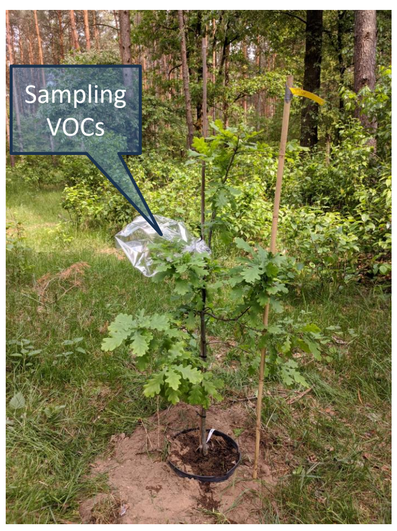
1) Place pairs of oak saplings in forest dominated by oak, beach, or pine

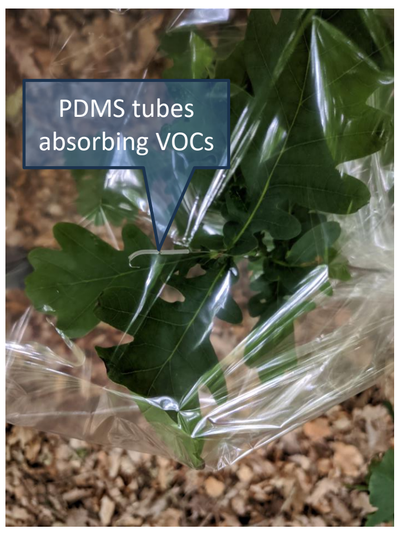
2) Treat with methyl jasmonate (MeJA) or control

3) Measure volatile organic compounds (VOC)[4]

4) Trap insects with Malaise traps[3]

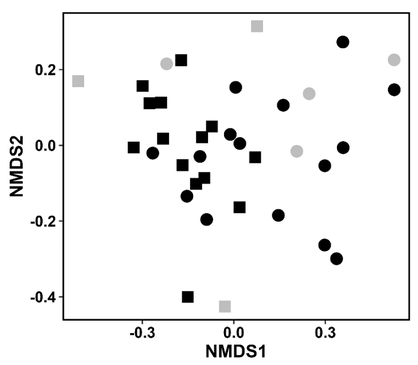
5) Count and ID parasitoid wasps using DNA metabarcoding





RESULTS

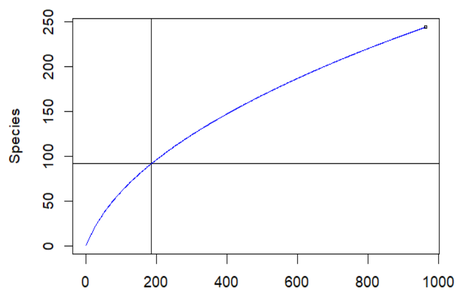
1) VOCs induced by MeJA differ between the two species of oak

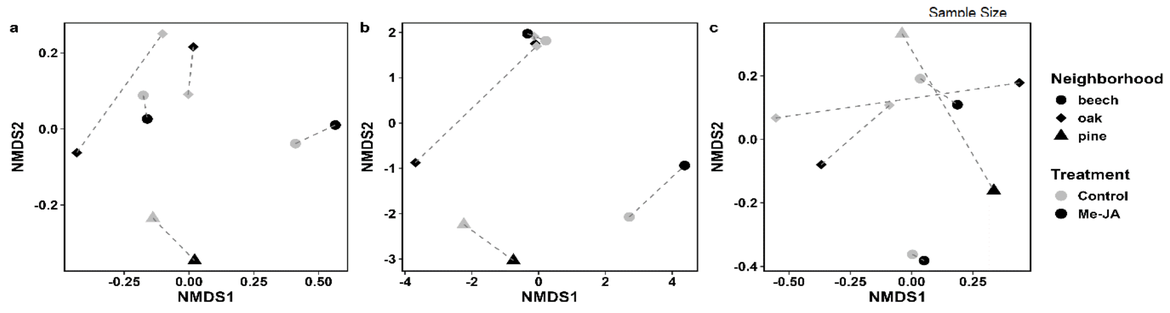


	Df	SoS	R2	F-value	P-value
Species	1	0.436	0.053	2.27	**0.036**
Treatment	1	1.207	0.147	6.27	**0.001**
Species:Treatment	1	0.391	0.048	2.03	0.057
Residual	32	6.157	0.752		
Total	35	8.191	1		

Non-metric multi-dimensional scaling (NMDS) plots of log volatile organic compounds (VOC) emissions of oak saplings by MeJA treatment (C = control, T = MeJA treatment) and species (*Q. petraea* vs *Q. robur*) with PERMANOVA results.

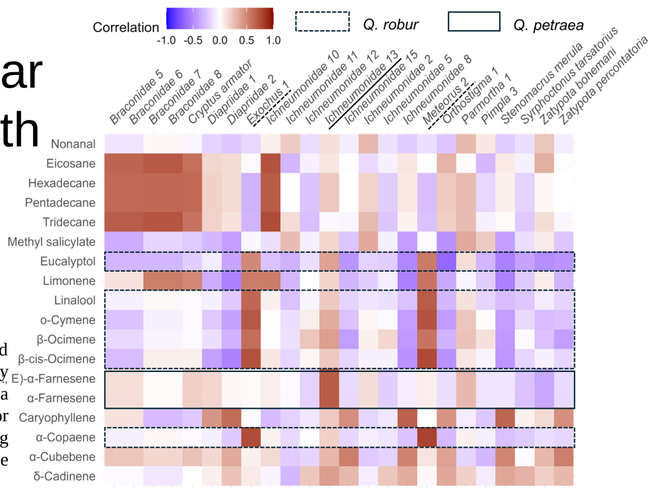
2) High diversity of parasitoids
3) Community composition differs between sites/ canopy composition, NOT by MeJA treatment





NMDS results for a) all parasitoids, b) parasitoids not shown to be associated with oaks, and c) parasitoids associated with oaks

4) Abundance of particular parasitoids correlated with emission of particular induced VOCs



Exploration of Pearson correlation coefficients between log-transformed VOC emissions and the number of individuals of the most commonly intercepted oak-associated parasitoids across ten saplings placed in a forest in Poland. VOCs that are elevated upon induction are marked for each species of oak with boxes (dotted or continuous lines, depending on the species) and parasitoid species that appear associated with these VOCs are underlined in the matching style.

CONCLUSIONS

- MeJA induction causes different VOC emissions in *Quercus robur & Q. petraea*.
- No clear evidence of effects of VOC emissions on parasitoid communities in the forest understory.
- Canopy composition appears to affect parasitoid community in understory.
- Further studies needed into to:

a) how different parasitoid lineages move in the landscape

b) response to canopy composition, VOC profiles, and plant size.

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