Pollinator communities in some selected hungarian conventional, organic and permaculture horticultures

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Introduction

Increasing agricultural intensification→ decreasing biodiversity

Habitat fragmentation, farming practices→ serious decline in pollinator communities' abundance, diversity

Pollination is essential → 75% of cultivated crops would drop

Objective → compare different farming systems (permaculture, organic and conventional farming) by pollinator communities

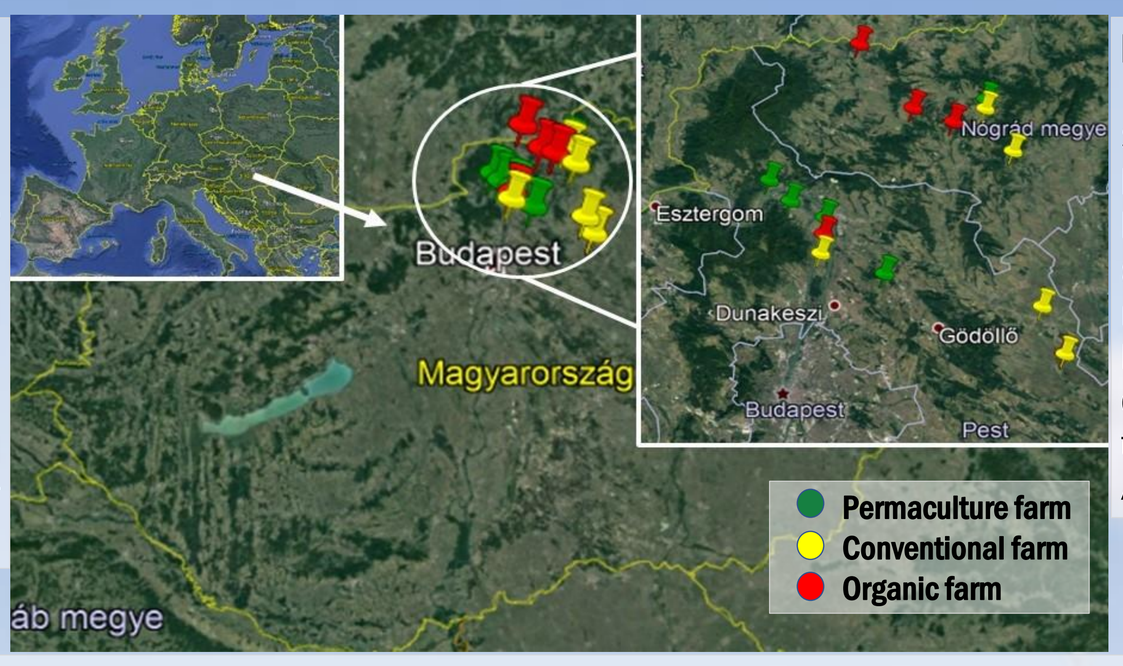


Figure 1. Location of the 15 study sites in northern Hungary (own editing)

Methods

Site selection → similar size (0.3±3 hectares), agro-ecological features, horticultural production → 15 sites (conventional, organic, permaculture) in northern Hungary (Fig.1.)

Pollinators → transect sampling 0,5 hour duration/site, 3 times in 2020, 14 different taxonomic categories

Analyses→ Excel 2016, R 3.5.1.

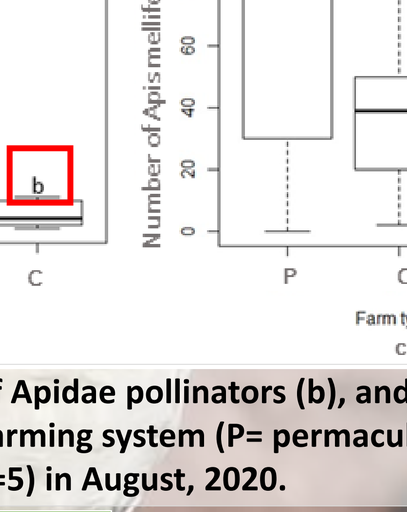


Figure 4. *Bombus terrestris* feeding on *Phacelia tanacetifolia (photo by Fanni Mészáros, 2020)*

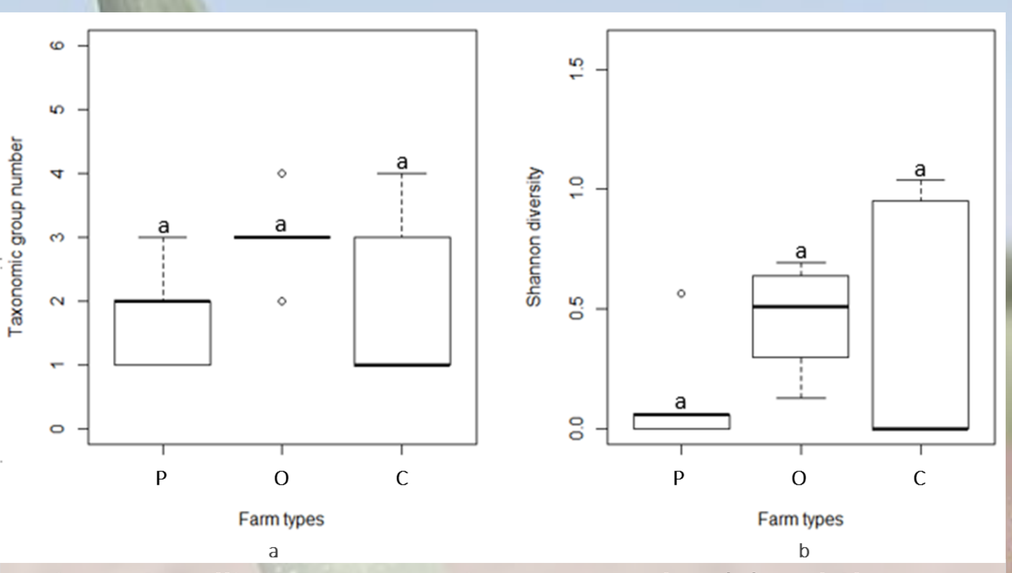


Figure 2. Pollinator taxonomic group number (a) and Shannon diversity (b) in the three studied farming system (P= permaculture, O= organic, C= conventional farms, n=5) in August, 2020.

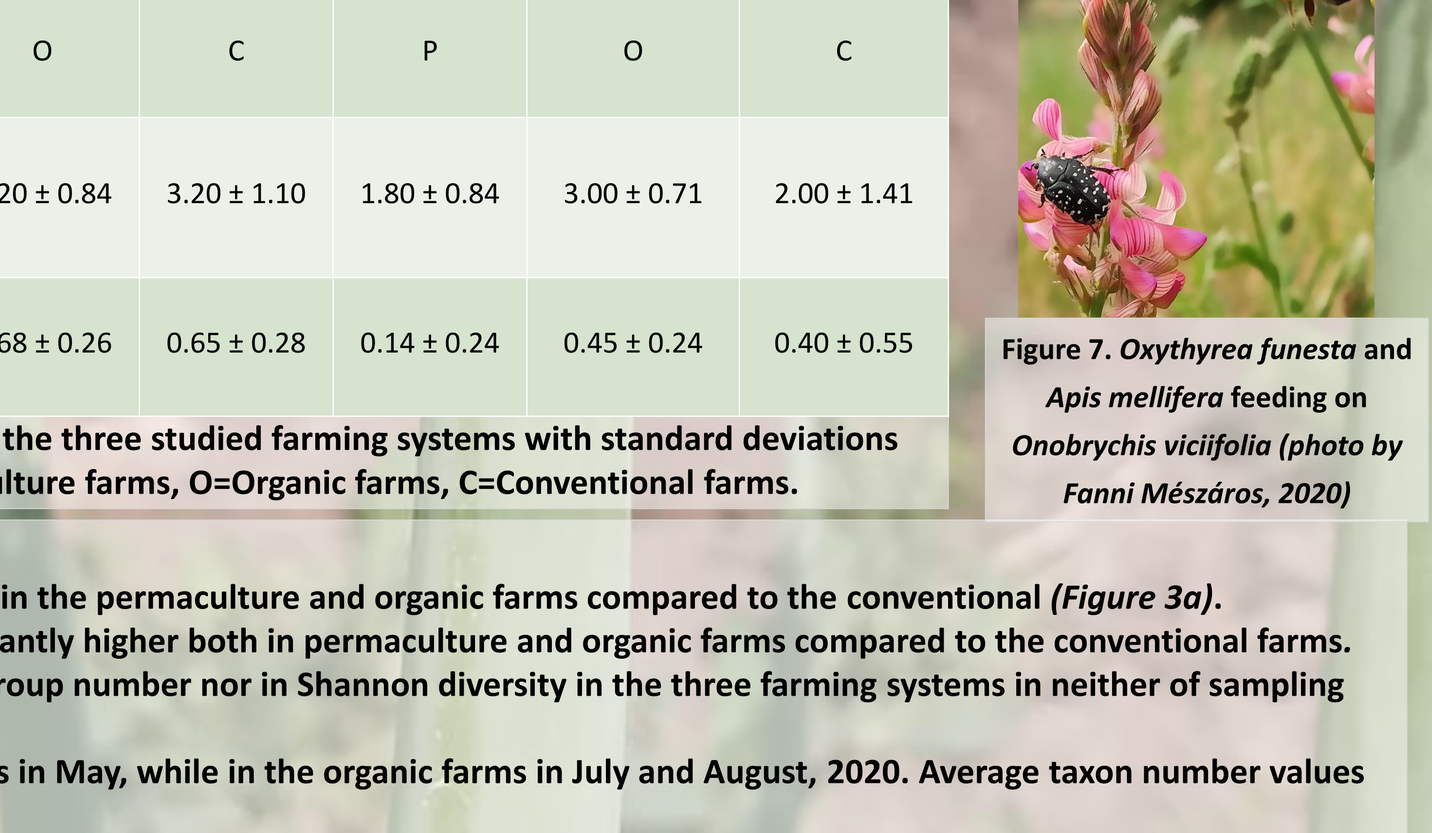
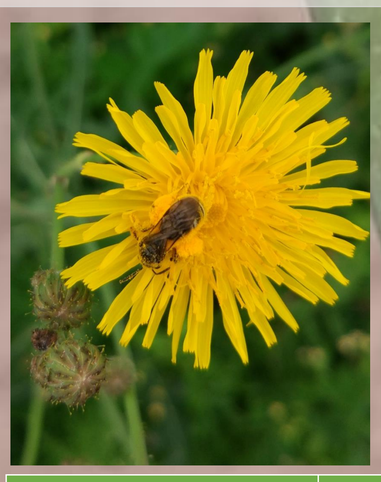


Figure 3. Total number of pollinators (a), frequency of Apidae pollinators (b), and number of Apis mellifera individuals (c) in the three studied farming system (P= permaculture, O= organic, C= conventional farms, n=5) in August, 2020.



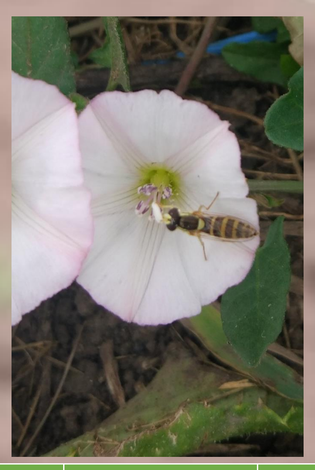


Figure 5. (left) member of Halictidae family feeding on *Picris hieracioides*, Figure 6 (right) member of Syrphidae family feeding on *Convolvulus arvensis (photos by Fanni Mészáros, 2020)*

Sampling date	May	May	May	July	July	July	August	August	August
Farming system	P	O	C	P	O	C	P	O	C
Taxon number (MEAN ± SD)	4.40 ± 1.14	4.00 ± 1.22	2.40 ± 1.34	4.00 ± 1.22	4.20 ± 0.84	3.20 ± 1.10	1.80 ± 0.84	3.00 ± 0.71	2.00 ± 1.41
Shannon diversity (MEAN ± SD)	0.85 ± 0.47	0.70 ± 0.32	0.58 ± 0.54	0.55 ± 0.28	0.68 ± 0.26	0.65 ± 0.28	0.14 ± 0.24	0.45 ± 0.24	0.40 ± 0.55

Table 1. Average Shannon diversity and taxon number of pollinators in the three studied farming systems with standard deviations during samplings in 2020 may, july and august (n=5). P=Permaculture farms, O=Organic farms, C=Conventional farms.

Figure 7. *Oxythyrea funesta* and *Apis mellifera* feeding on *Onobrychis viciifolia (photo by Fanni Mészáros, 2020)*

Results

- The total number of pollinators were significantly higher in August in the permaculture and organic farms compared to the conventional *(Figure 3a)*.
- Apidae species *(Figure 3b)* and honey bees *(Figure 3c)* were significantly higher both in permaculture and organic farms compared to the conventional farms.
- We did not find significant difference in the pollinator taxonomic group number nor in Shannon diversity in the three farming systems in neither of sampling times, figure 2 shows the results in August, 2020 *(Figure 2 ab).*
- Shannon diversity index average was highest in permaculture farms in May, while in the organic farms in July and August, 2020. Average taxon number values showed the same trend *(Table 1.).*

Conclusion

- Based on the pollinator abundance data we suggest that permaculture farms could provide favorable conditions for pollinators, specially for Apidae taxon.
- We emphasize that besides ecological indicators and conditions we have to investigate the attitude of farmers as it determines farm management decisions.

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