

# Pollen load analysis reveals feeding preference of bee pollinators of *Dictamnus albus* L.

Alessandro Fisogni<sup>1</sup>, Francesca Corvucci<sup>2</sup>, Francesca-Vittoria Grillenzoni<sup>2</sup>, Gherardo Bogo<sup>2</sup>, Laura Bortolotti<sup>2</sup>, Marino Quaranta<sup>3</sup>, Elisa Monterastelli<sup>1</sup>, Marta Galloni<sup>1</sup>

<sup>1</sup> Università di Bologna, Dipartimento di Scienze Biologiche, Geologiche e Ambientali. Via Imerio, 42 - 40126 Bologna, Italy.

<sup>2</sup> Consiglio per la Ricerca e la sperimentazione in Agricoltura - Unità di ricerca di apicoltura e bachicoltura. Via di Saliceto, 80 - 40128 Bologna, Italy.

<sup>3</sup> Consiglio per la Ricerca e la sperimentazione in Agricoltura - Centro di ricerca per l'agrobiologia e la pedologia. Piazza Massimo D'Azeglio, 30 - 50121 Firenze, Italy.

E-mail: alessandro.fisogni2@unibo.it

## Introduction and objectives

*Dictamnus albus* L. (Rutaceae) is a long-lived perennial herb; flowers produce abundant pollen and nectar and are visited by several insects. Observations on insect behaviour showed that medium and large bees have the highest percentage of contacts with receptive stigmas, i.e. they have the highest probability of acting as valuable pollinators [1].

Entomopalynological analysis allowed to understand the potential efficiency as **pollinating agent** of each taxon, and to improve the knowledge of wild pollinators' **feeding choices**.

Moreover, it allowed to define the role of *D. albus* as a source of food in **synergy** or in **competition** with co-flowering species.

## Materials and methods

- Pollinators, i.e. visitors that contacted reproductive structures, were sampled while visiting open flowers during full blooming of *D. albus* (end of April – beginning of May);
- Insects were brought to the laboratory, pollen was removed from different body parts, counted and identified (family, genus or species);
- Pollen passively deposited on the insects and actively collected grains were analysed and compared (2011-2014), and specific pollen composition was investigated considering total pollen loads (2014).



*Bombus terrestris* on *D. albus*



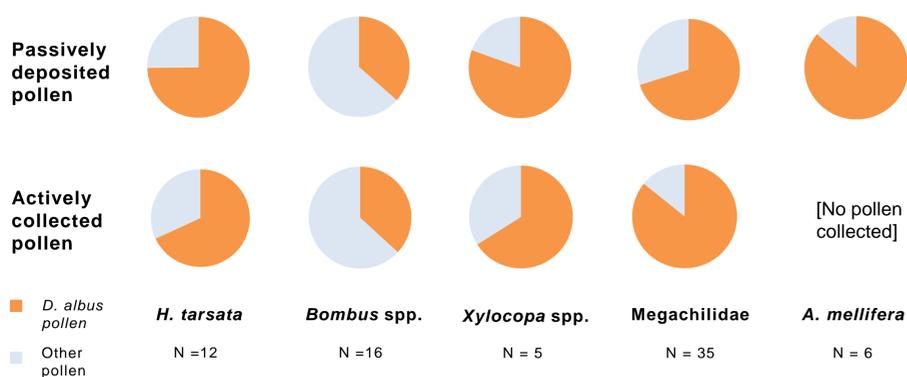
*Dictamnus albus* pollen (400x)

## Results

The percentages of *Dictamnus albus* pollen passively deposited on insects seeking nectar were generally high (>70%), with the only exception of bumble bees.

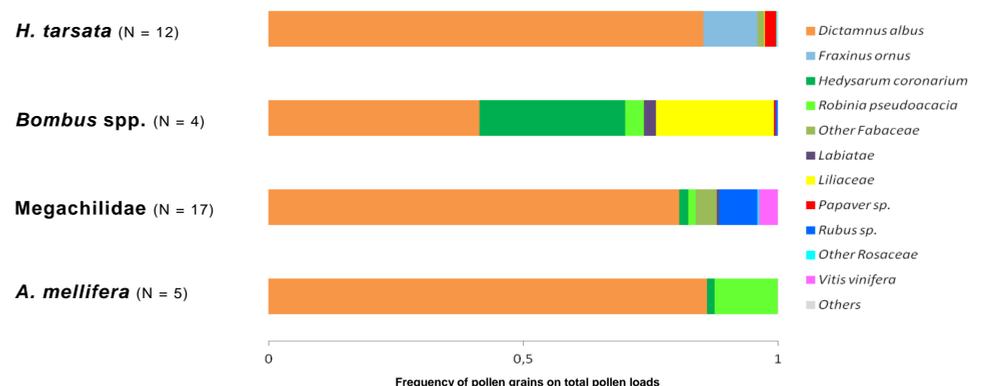
Insects actively collected pollen of *D. albus* in different amounts: the highest number of grains was found in megachilids, while sampled honey bees (*Apis mellifera*) did not collect this pollen.

No significant differences were found in the percentage of *D. albus* between passively deposited and actively collected pollen loads, showing a significant fidelity of the pollinator guild.



The analysis of specific pollen loads highlights a division of food resources among pollinators in the area; there is not a common trend of preference towards co-flowering species except for *D. albus*.

Specifically, social bees preferred *Hedysarum coronarium* and *Robinia pseudoacacia*, while the solitary bee *Habropoda tarsata* mainly visited *Fraxinus ornus*. Megachilids fed on legumes and *Rubus* spp.; bumble bees showed a significant preference towards *Hedysarum coronarium* and Liliaceae spp., which may reduce their fidelity to *D. albus*.



## Conclusions

During full blooming, bee pollinators chose *Dictamnus albus* as a favourite food resource for both pollen and nectar. Pollen load analysis confirmed their role as efficient pollen vectors. The studied plant benefits from flower visits by medium and large insects because of their efficiency and high fidelity, being preferred among co-flowered species.

## Practical consequences

Results support the efficacy of the conservation measures implemented within the PP-ICON Project [2]. Nesting sites for solitary bees were successfully placed in the site, local bumble bee queens were collected, reared in the laboratory and further colonies were reintroduced in the area. Finally, melittophilous plants with asynchronous blooming were transplanted to support the main pollinators of *D. albus* throughout their life cycle.

### References

- [1] Fisogni A, Rossi M, Cristofolini G, Galloni M. 2011. Pollinator directionality as a response to nectar gradient: promoting outcrossing while avoiding geitonogamy. *Plant Biology* 13:848-856.  
[2] www.pp-icon.eu

### Acknowledgements

This study was performed within the Life+ project PP-ICON/Plant-Pollinator Integrated Conservation approach: a demonstrative proposal (LIFE09/NAT/IT000212) co-financed by the LIFE Programme of the European Union. We thank Francesca Rovetti for the insect picture, and all the students that contributed to data recording.



ALMA MATER STUDIORUM  
UNIVERSITÀ DI BOLOGNA



CONSIGLIO PER LA RICERCA  
E LA SPERIMENTAZIONE  
IN AGRICOLTURA  
UNITÀ DI RICERCA DI APICOLTURA E BACHICOLTURA

