

The behavior of the stingless bee *Melipona fasciculata* (Apidae, Meliponini) on eggplant flowers and consequences for pollination



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Importance of pollination

Reproduction of 87.5%
of flowering plants
(Ollerton et al., 2011)

Around 75% of crops
depend on animal
pollination (Sheperd et al., 2003)

Bees: main pollinators

Comercially:

Apis mellifera (Slaa et al., 2006; Klein et al., 2007) and some
Bombus species: *B. terrestris* and *B. impatiens* on
tomato pollination (Velthuis & van Doorn, 2006)

Buzz pollination

6 - 8% angiosperms: poricid anthers (Buchmann, 1983)







Buzz pollination

Important for some agricultural crops



Brazil:

- no *Bombus* rearing
- no importation allowed



Alternative?
Melipona?



Eggplant (*Solanum melongena* L.) reproductive biology

Self compatible

Self pollination

Benefit from bee
pollination (Kowalska, 2008)

Short, medium and
long styled flowers

Fruit set:

SS \square LS

(Ryslki *et al.*, 1984, Kowalska,
2008, Sękara & Bieniasz, 2008)





Aim:

Investigate the consequences of
bee behavior to pollination

**Number of pollen
grains deposited on
stigmata of flowers**

**Number of pollen
tubes formed on the
style**



Number of visits

**Time the bees remained (landed) on the flower
during their visits and with the number of
buzzes performed by the individuals**



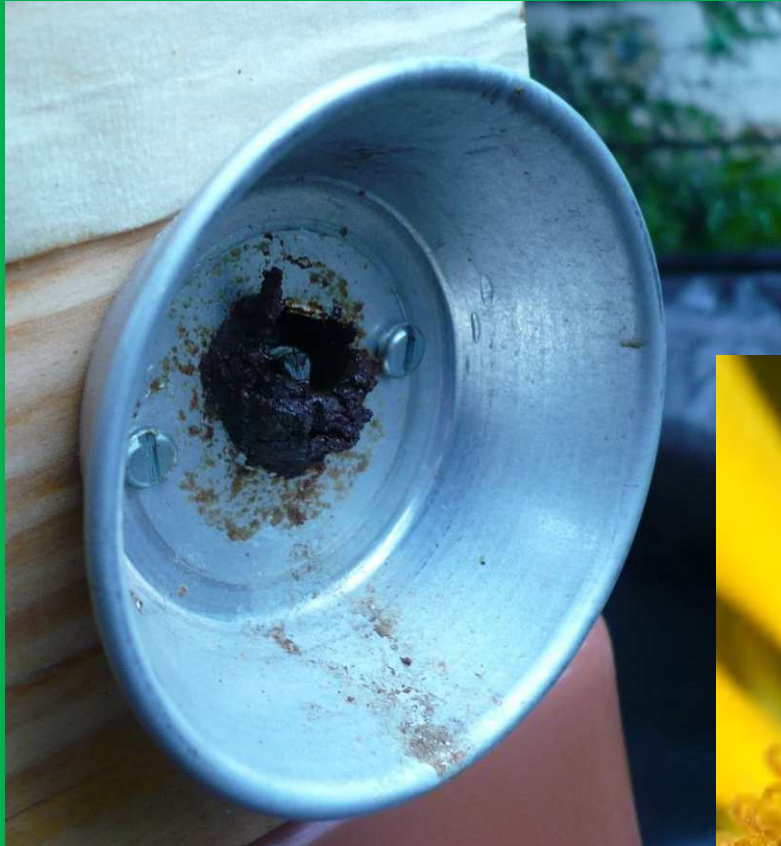
Greenhouse: 6.4m x 9m. Area = 57.6m². Max height: 3.5m.

48 to 50 plants. *Solanum melongena* L. var. Embu



One colony of *Melipona fasciculata*

- Introduction: 90 days after plants were potted
- Around a month inside the greenhouse
- It was fed every 15 days with *Apis mellifera* honey





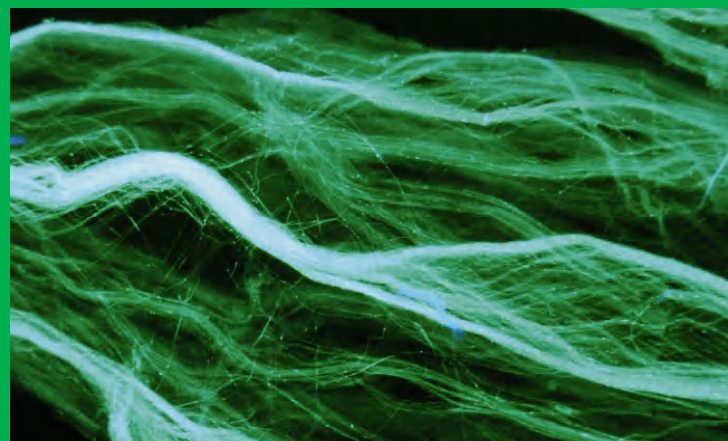
Bagged flower buds



Recorded the first visits to long
styled flowers



Flower bagged again



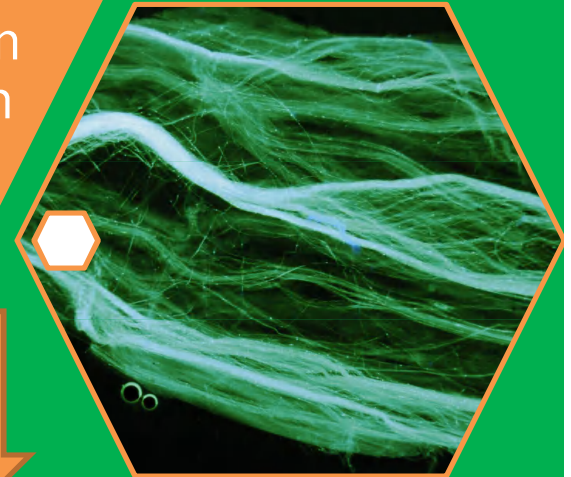
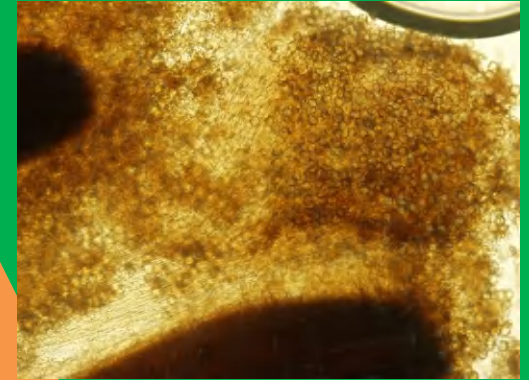
Collected after 24h /48h: standard
fluorescent staining technique

Bee behavior



Time landed
on flowers
and number
of buzzes

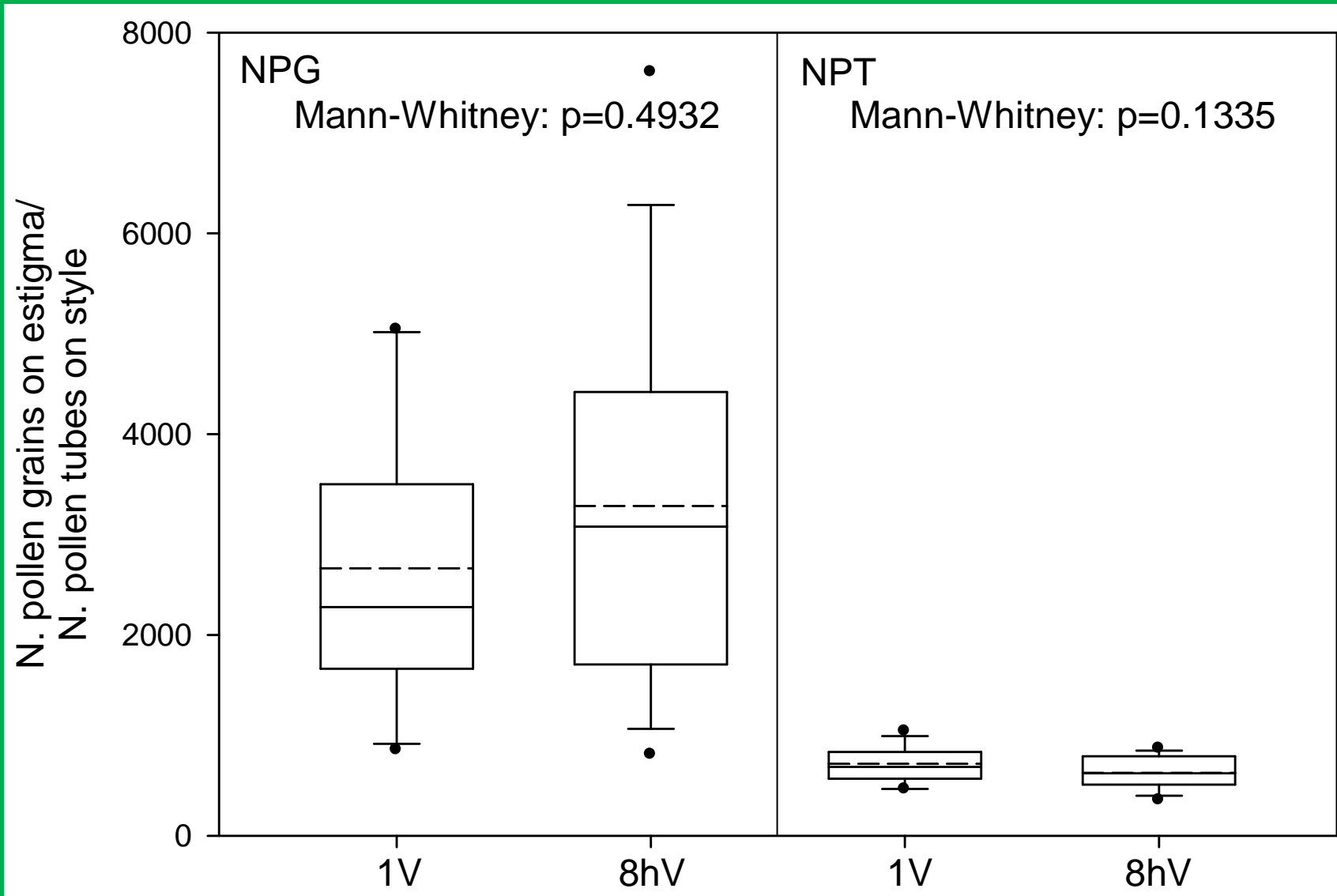
Number of
pollen grains
deposited on
stigmata and
number of pollen
tubes formed on
the style



Land → Buzz → Fly and
pack → Land → Buzz → Fly
and pack/ go to other
flower

1 visit (1V)
Free visitation for 8
hours (8hV)

Number of pollen grains and pollen tubes versus number of visits



One visit of *Melipona fasciculata* is enough to promote pollination

Pollen tubes reach
ovules and fecund
ovules on both
cases (1V e 8hV)

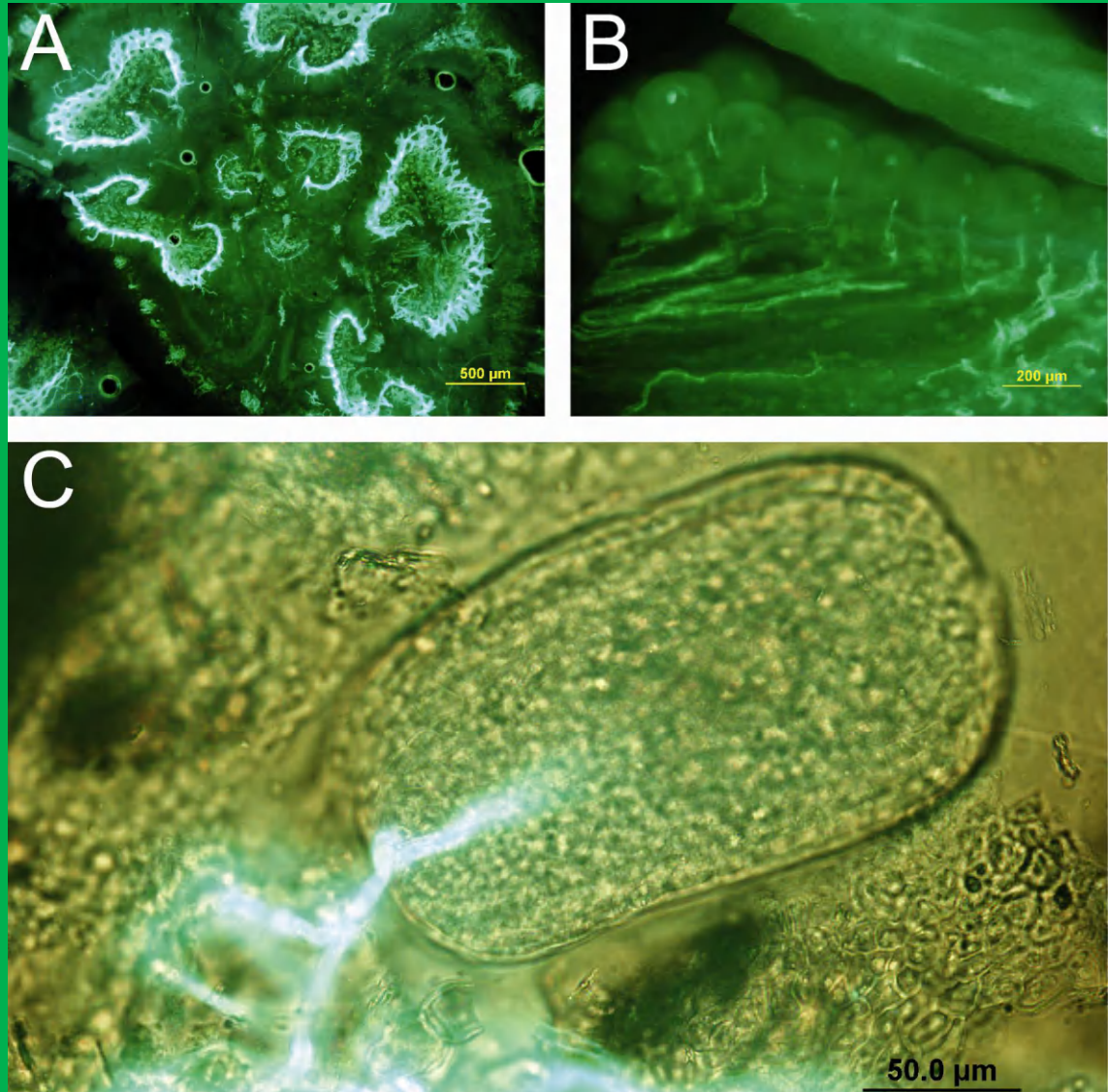
Number of pollen
grains on stigma
after 1V:

2662 ± 1355

Number of seeds:

2500

(Mc Gregor, 1976)



Amount of pollen grains deposited on stigmata versus bee behavior

Spearman correlation test. N= sample size.

	Number of buzzes	Time landed (s)	N
Time landed (s)	0.82*	-	9
Number of pollen grains	0.55 ^{ns}	0.65 ^{ns}	9

* Significant at $\alpha=0.05$

^{ns} not significant at $\alpha=0.05$

Amount of pollen tubes on style versus bee behavior

Spearman correlation test. N= sample size.

	Number of buzzes	Time landed (s)	N
Time landed (s)	0.91*	-	17
Number of pollen tubes	0.56*	0.49*	17

* Significant at $\alpha=0.05$

^{ns} not significant at $\alpha=0.05$

**Attention to visit characteristics →
ensure adequate pollination**



**Resource availability, environmental characteristics
affect visitation pattern and pollination** (Totland &
Matthews, 1998; Veddeler et al., 2006; Chacoff et al., 2008; Jha &
Vandermeer, 2009)



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Thanks for your attention!

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