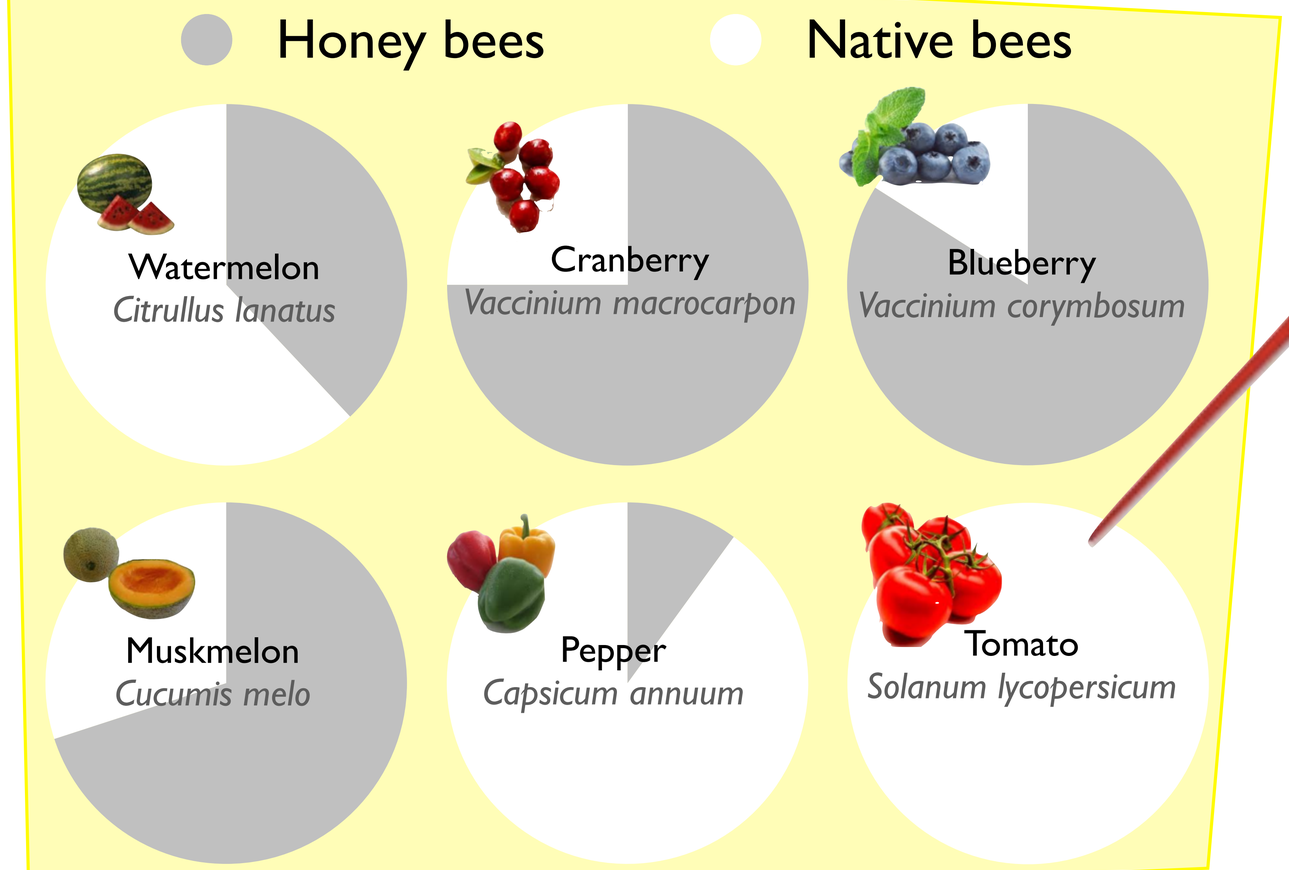
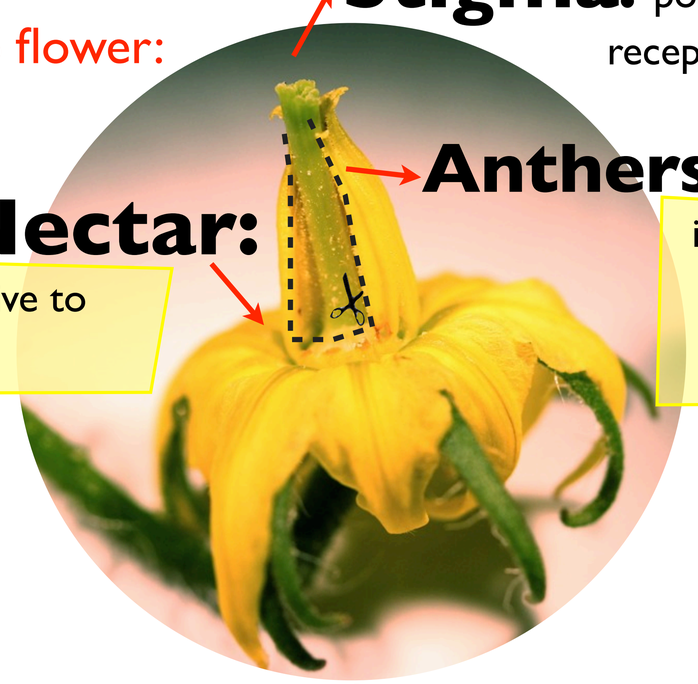
Tomato Pollination

Who is Visiting Crop Flowers in New Jersey?



Why is tomato only visited by native bees?

Tomato flower:



But can't tomato self-pollinate without bees?

Yes... **90%** of the varieties are **self-compatible** (pollen grains can pollinate the stigma of same flower), **but** not all (e.g. SunGold). Moreover, some varieties have **long exerted stigmas** (see ↕) making it more difficult for the pollen from its own cone to reach the stigma without help. What then?

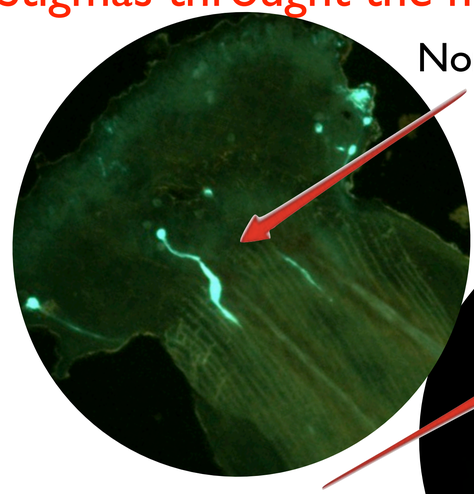
Then,

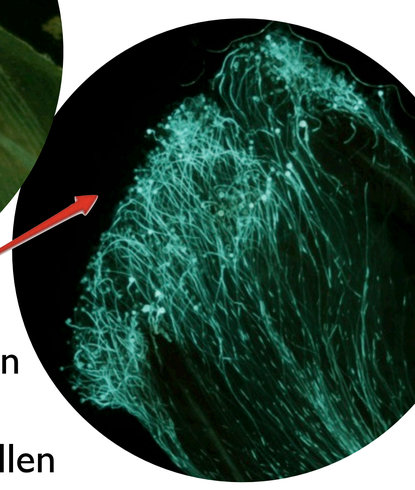
Gravity < **Wind** < **Bees**

- **Gravity**: works well in inserted stigmas
- **Wind**: helps pollen falling into stigmas (and helps self-pollinate)
- **Bees**: transfer lots of pollen (self and cross pollinate!)

That graph explains that on varieties with long exerted stigmas, **non visited flowers** (protected inside a bag to prevent bee visits), present between **10** and **300** pollen grains. This may produce 70-80% of tomatoes in most varieties, but they are usually smaller. However, only **10 bumblebee visits** provide more than **2000** pollen grains, which assure the production of big tomatoes.

Stigmas throught the microscope:



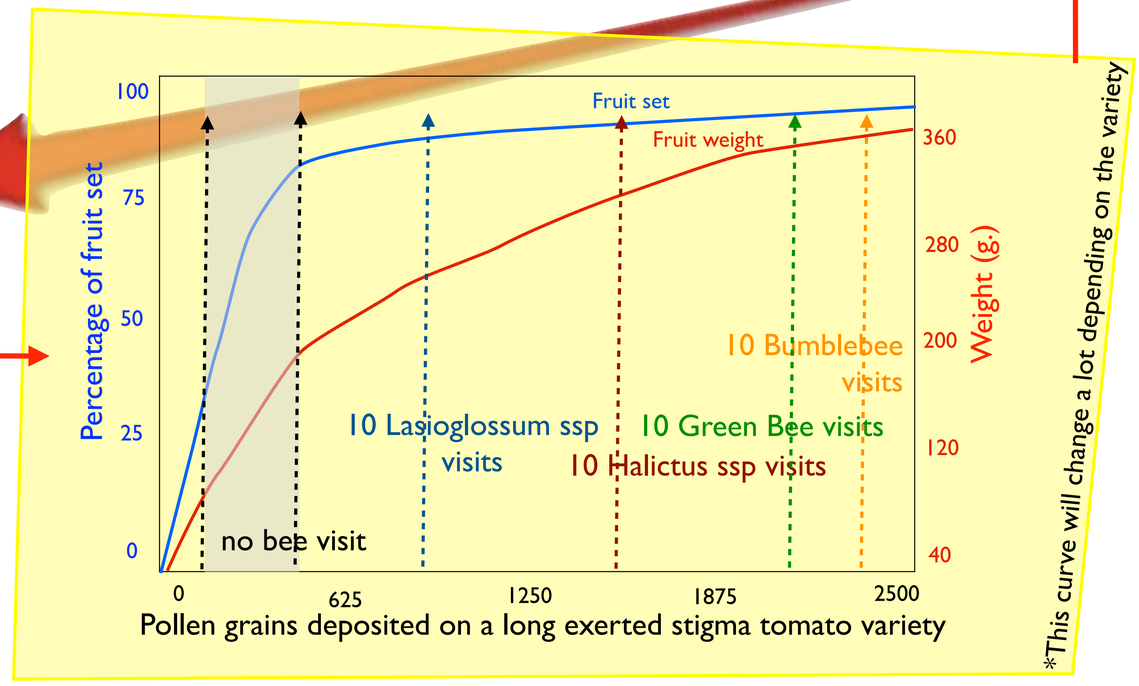


Thousands of pollen grains after bumblebee pollination, growing pollen tubes through the ovary (each pollen tube will fertilize a tomato seed)

Some Native Bees (but not Honey bees) can

BUZZ (Shake / Sonicate)

and the vibration extracts the pollen grains from the cone



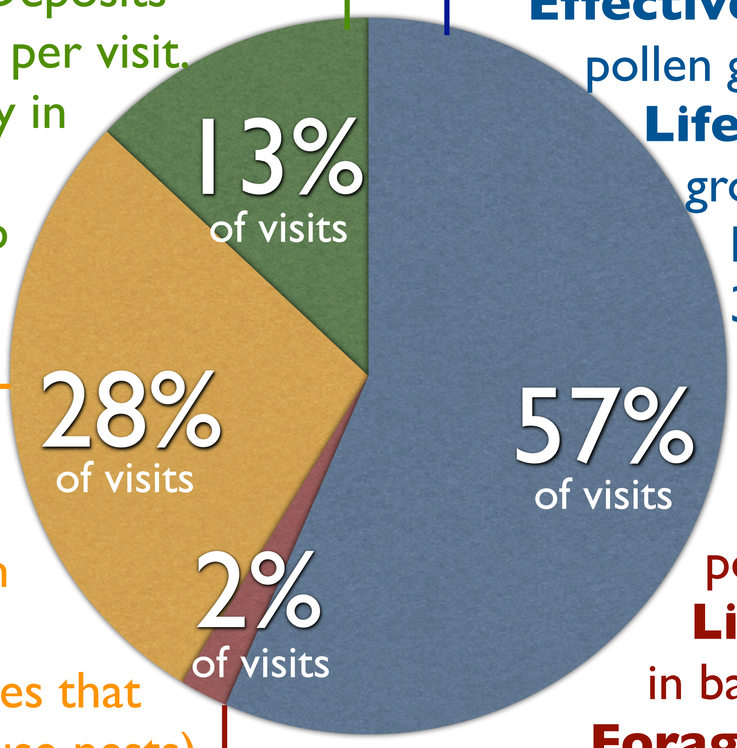
Main tomato pollinators in NJ

In NJ, native bees are frequent tomato visitors!

Green bees (Augochlorinii)
Effectiveness: Deposits ~ 230 pollen grains per visit.
Life: Nest solitarily in bare ground
Foraging range: up to 700m from the nest

Lasioglossum spp.
Effectiveness: Deposits ~ 115 pollen grains per visit.
Life: Nest solitarily in bare ground
Foraging range: up to 300m from the nest

Bumblebees (Bombus spp.)
Effectiveness: Deposits ~ 237 pollen grains per visit.
Life: Nest in big colonies that use old cavities (like mouse nests)
Foraging range: up to 3 Km from the nest



Halictus spp.
Effectiveness: Deposits ~ 150 pollen grains per visit.
Life: Nest solitarily in bare ground
Foraging range: up to 600m from the nest

Credits: **I. Bartomeus** (www.bartomeus.cat/ignasi); Sources: **Winfree** lab (winfreelab.rutgers.edu) unpublished data; Greenleaf & Kremen (2006) Biol. Cons. 133, 81-87; *Morandin et al. (2001) J. Econom. Entomol. 94,172-179; Bee photos: **B. Rosenthal** (www.photobotanicus.com/)