

Bumble bees as dispersal agents for Biocontrol products

Felix Wäckers

Yann Jacques

Kurt Put

Veerle Mommaerts

Guy Smagghe





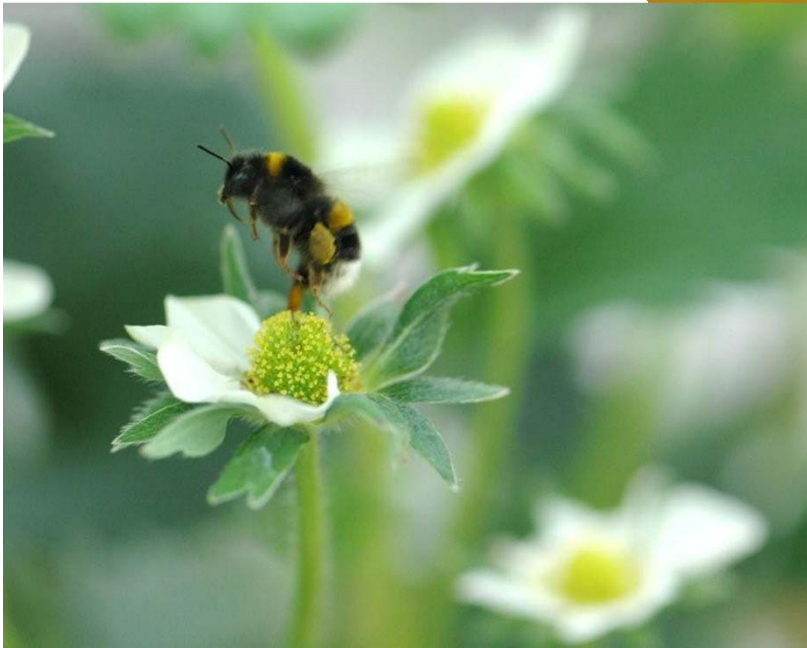
Dr. Roland De Jonghe: Founder of Biobest NV





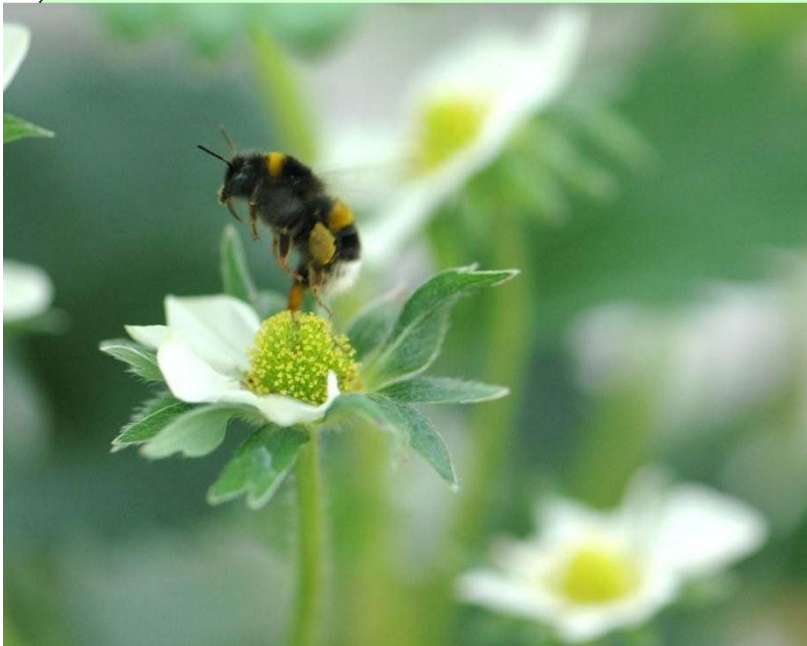
Dispenser applications

Pollination + Crop Protection



Vectors

- Honeybees (Peng et al., 1992)
- Bumblebees (Yu and Sutton, 1997)
- Mason Bees (Maccagnani et al., 2006)



Microbial Products

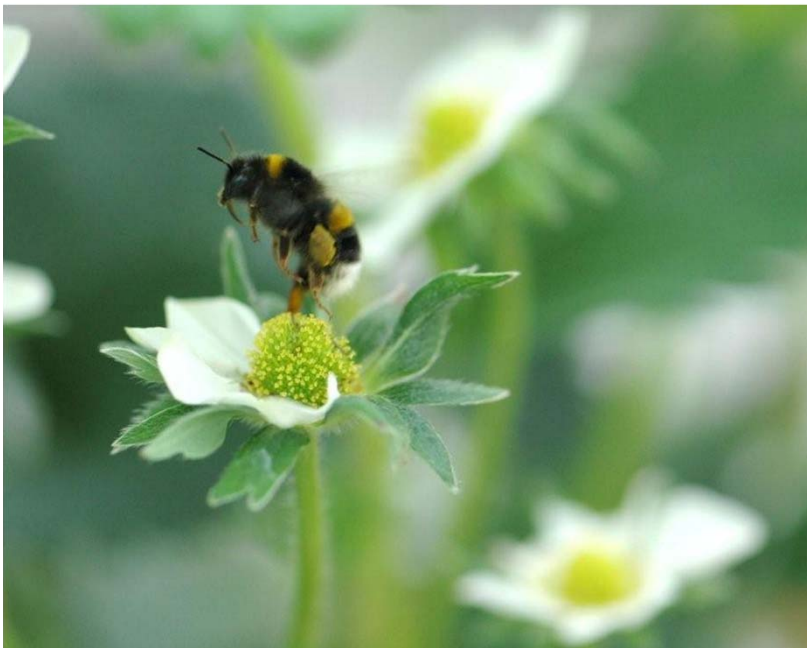
- Antagonistic fungi
- Bacterial products
- Insect Viruses

Targets

- Diseases
Pests
- Diseases
Pests
- Pests

Advantages bee dispenser technology

- Targeted application to flowers
- Minimizes use of product
- Continuous application
- Low labour requirements



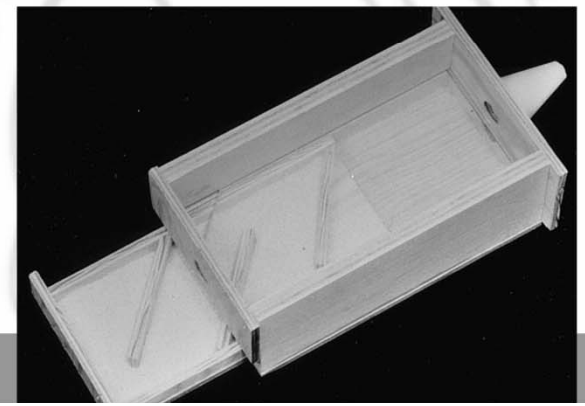
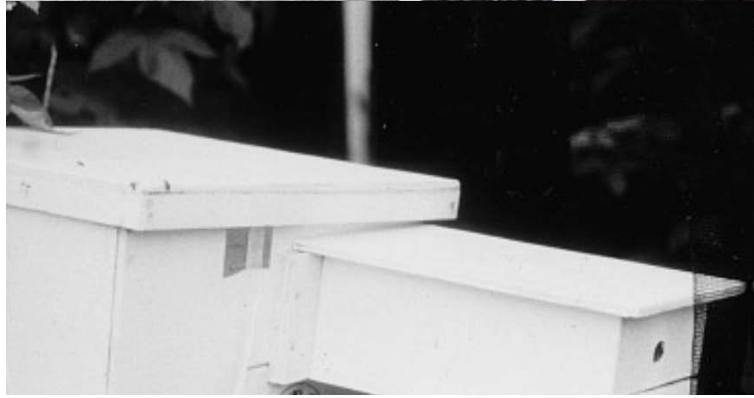
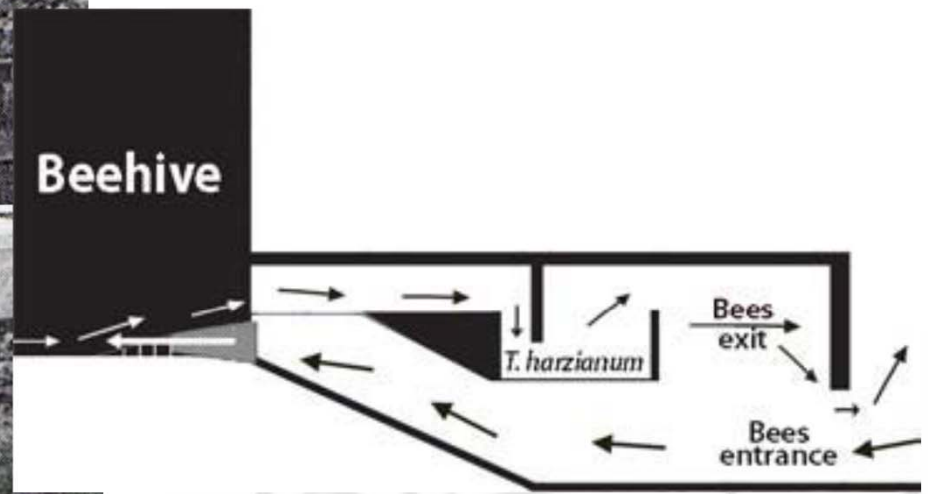
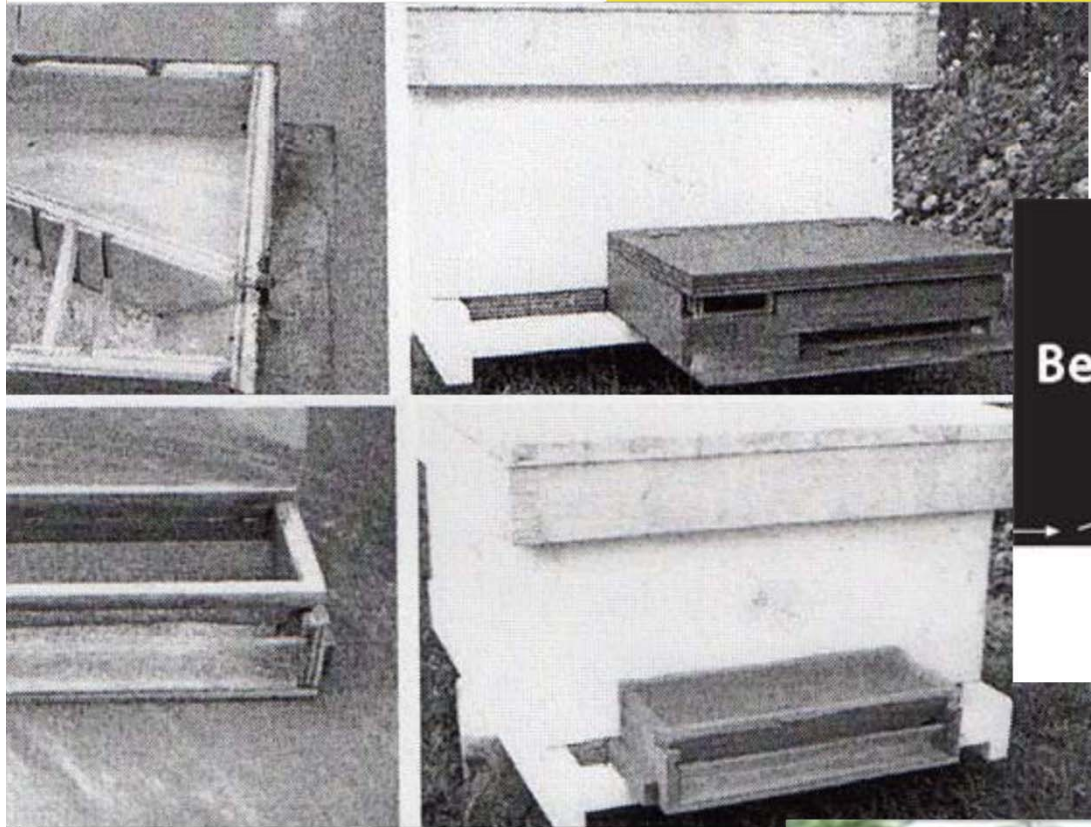


Possible Bottlenecks

- Impact on bumblebee flight/pollination activity
- Insufficient loads of outgoing bumble bees due to
 - dispenser design
 - product formulations
- Insufficient deposition of product at target
- Brood contamination with MCA (compatibility)



Dispenser types



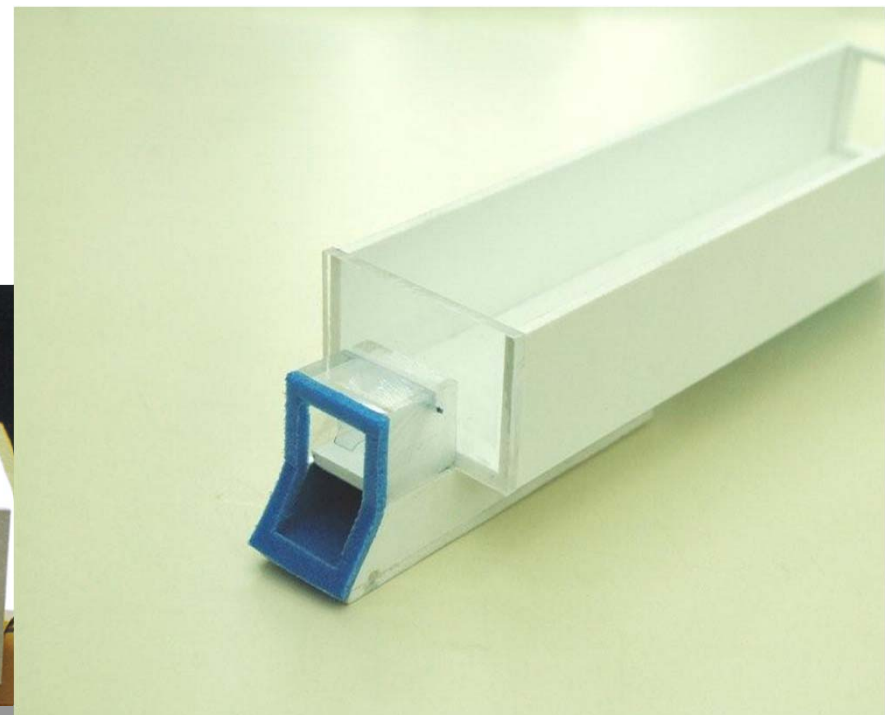
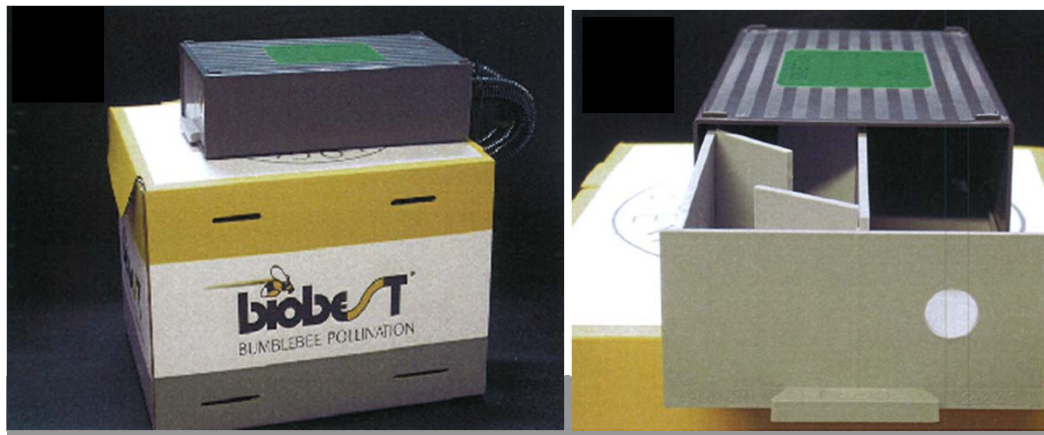
Insufficient flight activity

Available dispenser designs often reduced bumblebee flight activity relatively to standard hive

Solution

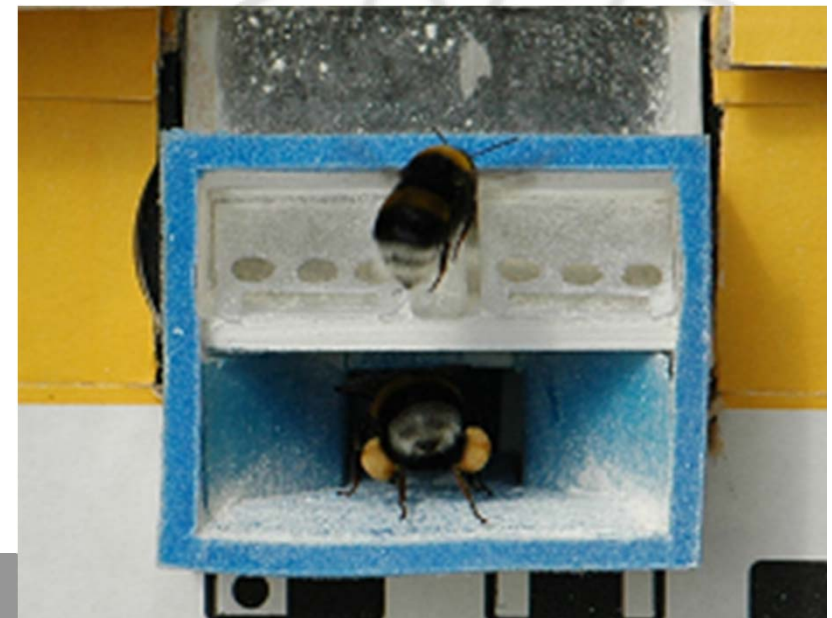
Biobest designed a new dispenser from scratch to address

- Flight activity
- Bumble bee load
- Problem of brood contamination



The new biobest dispenser (patent pending)

- Two chamber dispenser
- Valves to ensure 'one-way traffic'
- Can be fully integrated into standard hive

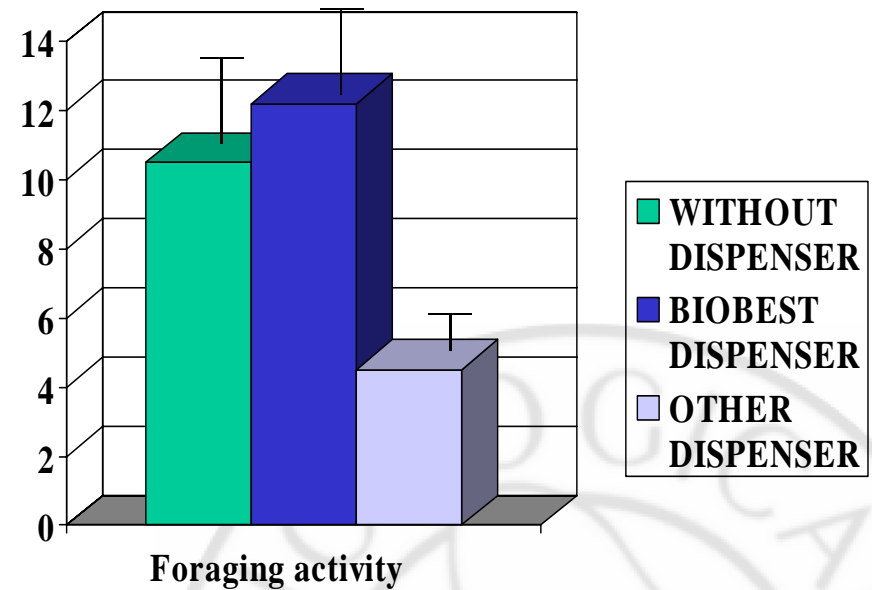




Dispenser hive Tongeren, 2010

27 October 2010

Foraging activity



New BIOBEST dispenser does not inhibit foraging



Bottlenecks

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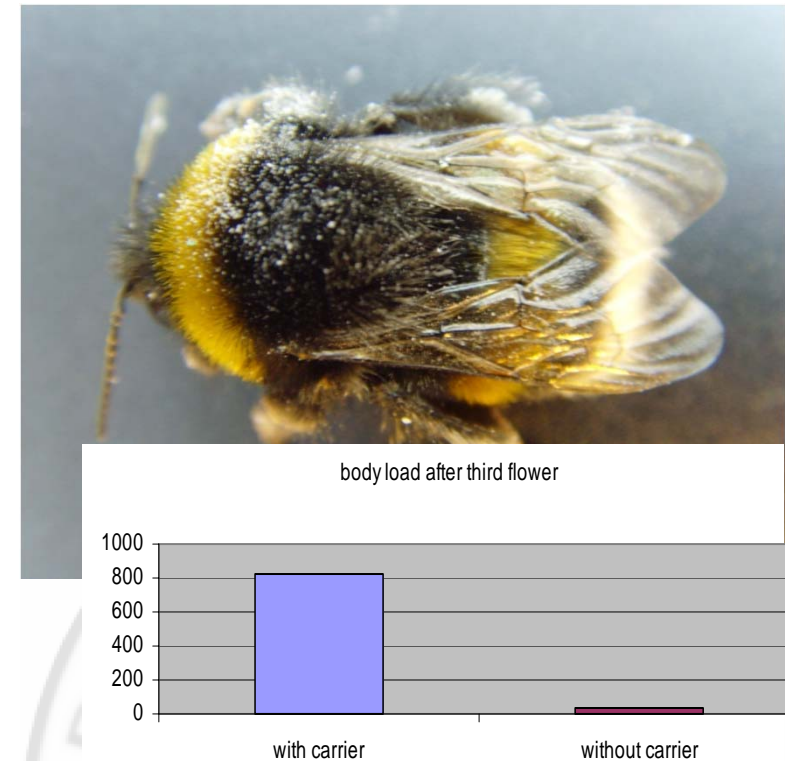
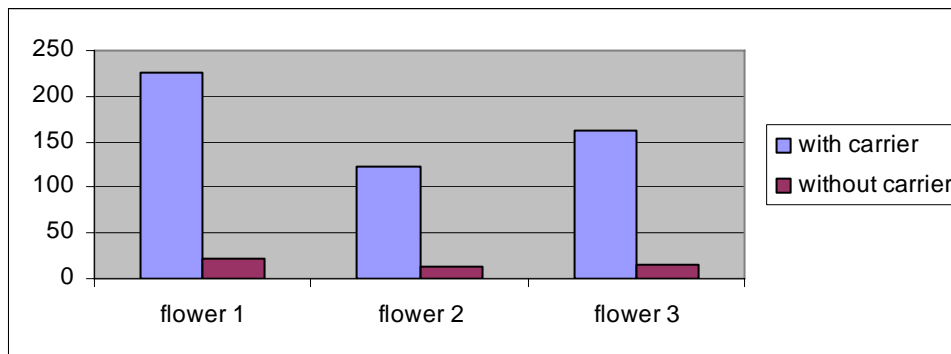
Average product load (upon exit)
 $3.7 * 10^5$ CFU

Head:	2%
Thorax:	56%
Abdomen:	36%
Legs:	6%



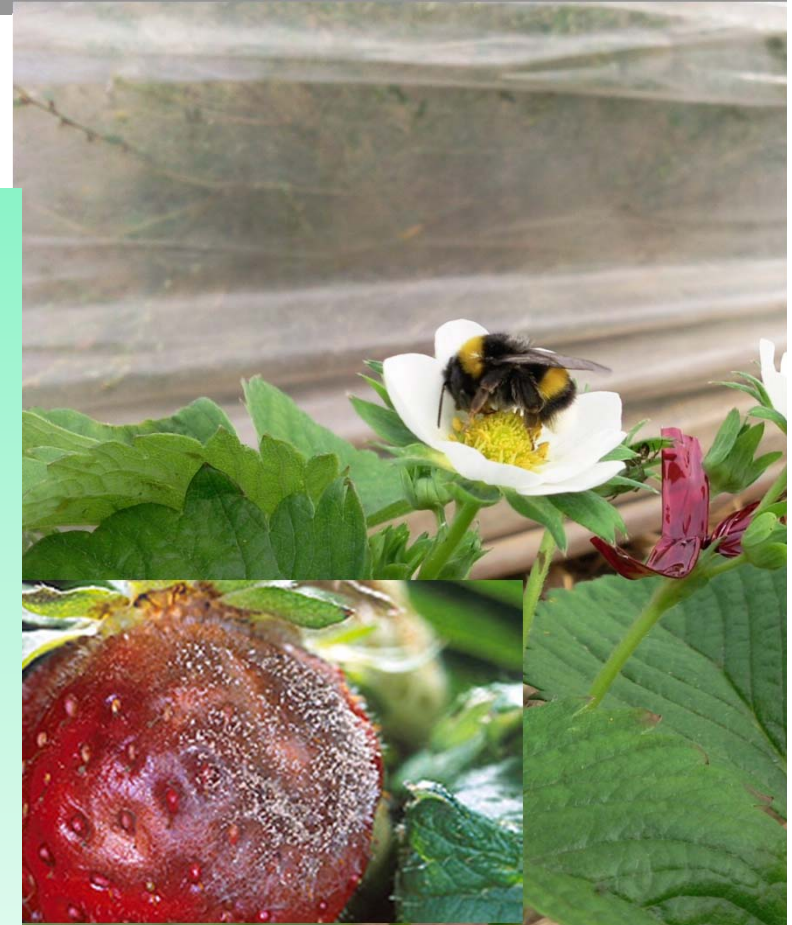
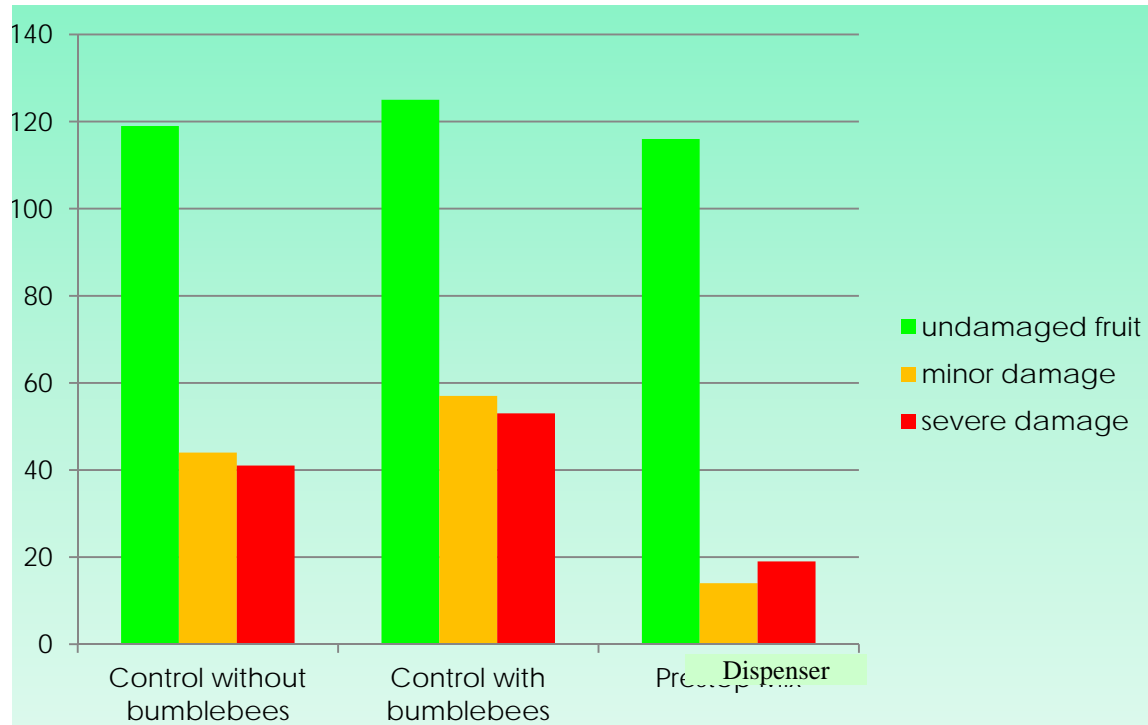
Initial load (upon exit)

- Without carrier: $3.7 * 10^5$ CFU
- With carrier: $4.1 * 10^5$ CFU



**Addition of carrier dramatically increases
adhesion and deposition of active ingredient**

Application: *Botrytis* control in strawberries





Other applications: Dispersal of MCA's for pest control

DEFRA Project in bell pepper (with FERA/STC, UK)

- Comparison of 5 MCA's for aphid/whitefly control
 - Assess impact of products on pests in lab trials
 - Assess impact of products on bumblebees
 - Based on above select two products for field trials



Example Kiwi berries

- Both male and female plants
- Three strategies to achieve pollination:
 - Grow male as well as female plants
 - Manually dust or spray pollen
 - Use commercially available pollen in dispenser hive



Orchard divided in three sections:

- dusting of pollen
- spraying of pollen suspension
- Biobest bumblebee dispenser

Bumblebees introduced at first flowering

- Excellent pollination in all three objects
- Dispenser refilled every third day



Thanks

