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QUÉBEC - CANADA

Laboratory, semi-field and field trials to assess the efficacy of *Bacillus thuringiensis* formulations against the larvae of the greater wax moth

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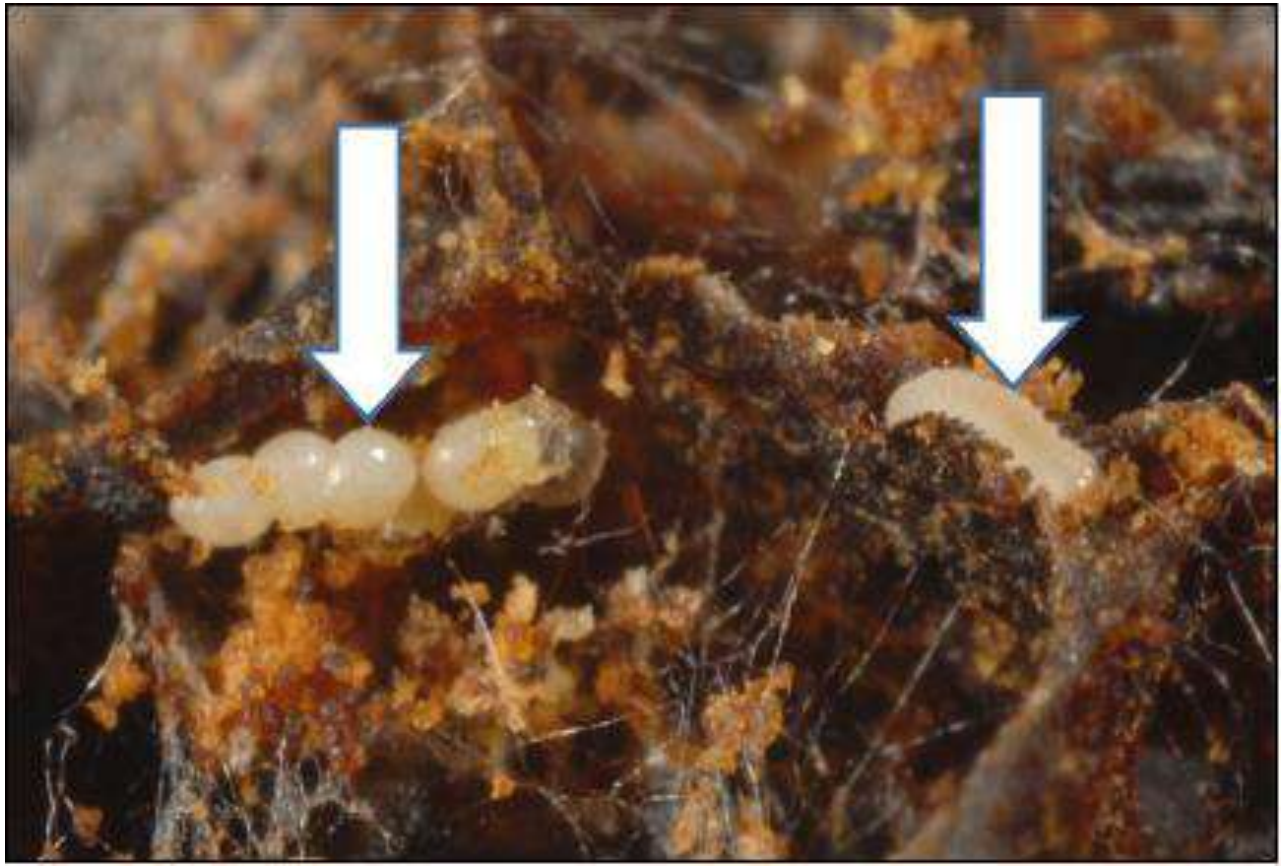
Greater Wax Moth
Gelleria mellonella

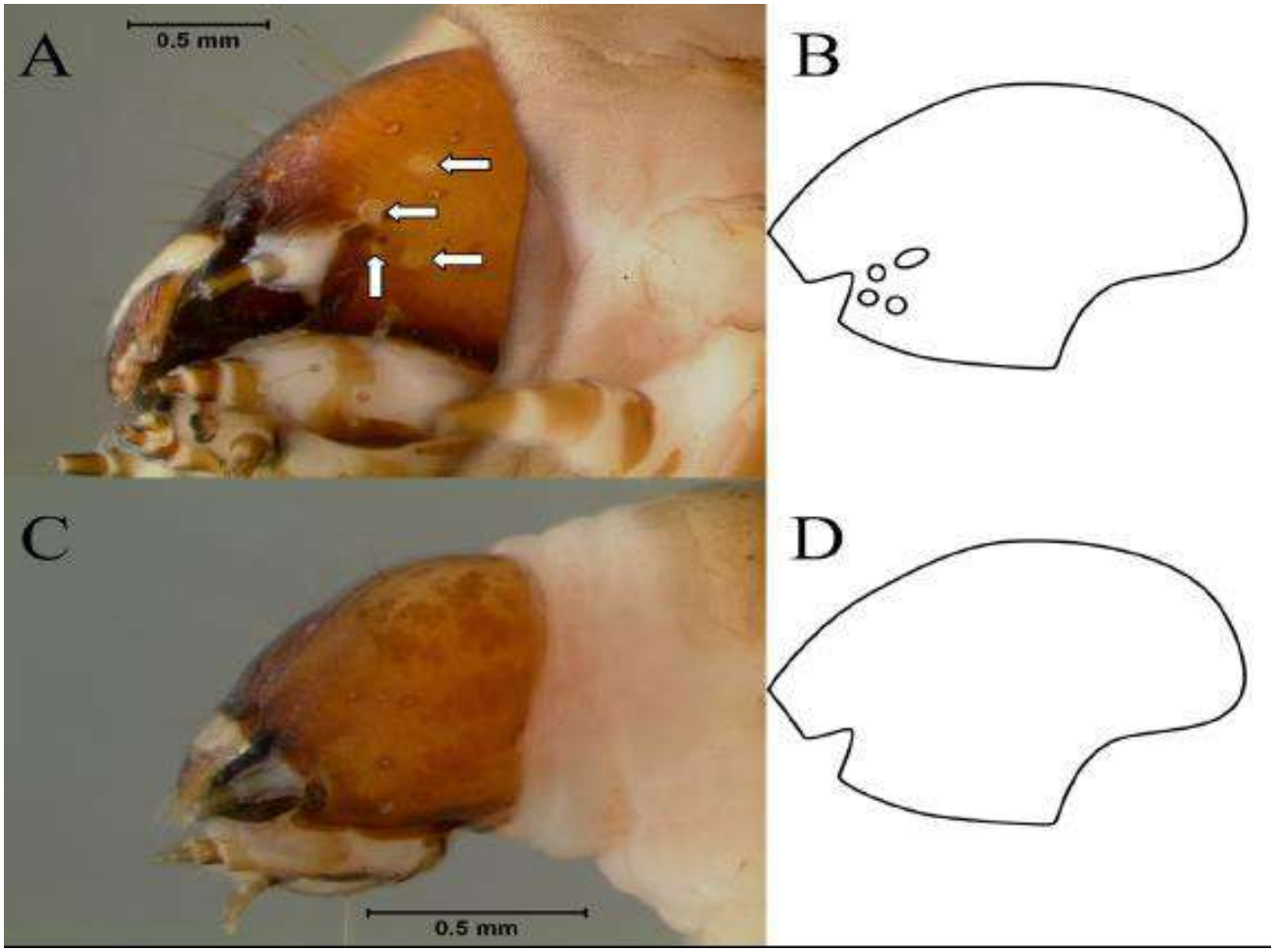
Greater Wax Moth
Gelleria mellonella



Eggs and 1st instar larvae

Photo by Lylle Buss, University of Florida

Greater Wax Moth
Gelleria mellonella



Head of greater (A-B) and lesser wax moth larvae (C-D)

Photo by Lylle Buss, University of Florida

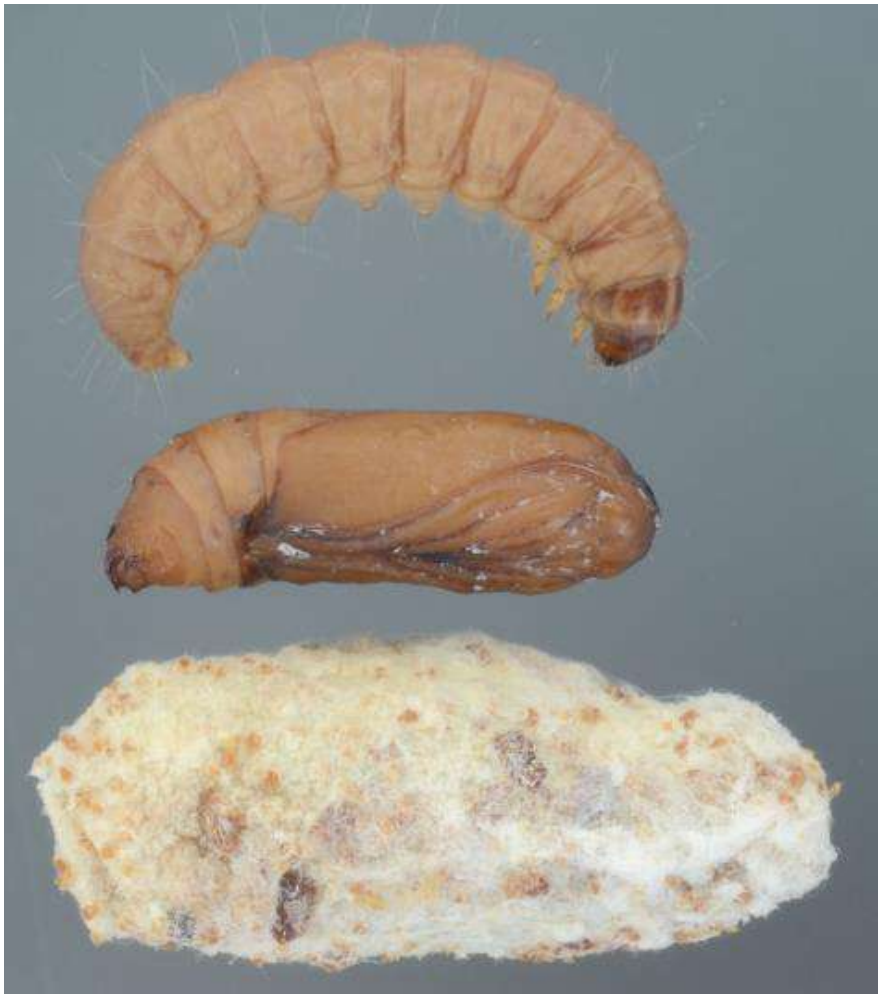
Greater Wax Moth
Gelleria mellonella

Greater wax moth larvae fed on honeybee combs

Photo by Lylle Buss, University of Florida

Greater wax moth damages

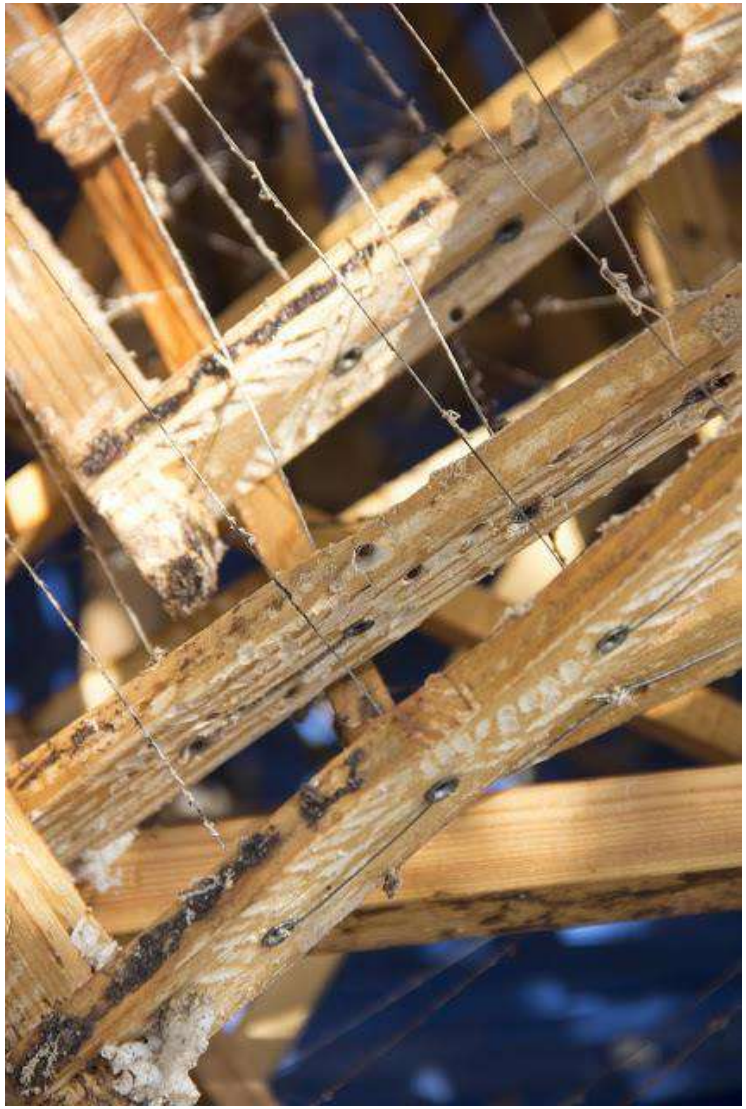
Gelleria mellonella Development



metamorphosis

Photo by Lylle Buss, University of Florida

Gelleria mellonella
Development



They can destroy wood, paper, textile, plastic…

Gelleria mellonella transfer

Gelleria mellonella development

Wax moth adults

Photo by Lylle Buss, University of Florida

Gelleria mellonella development

- Egg: Emerge of the larvae:


3 – 30 days


- Larvae:


5 – 20 weeks


- Pupae:


6 – 55 days

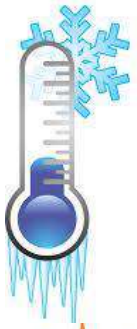

- Adults:

Average 700 eggs. Maximum 2000


Greater Wax Moth

Key-role of temperature!

Theoretically:



1 female: 700 offspring in 7 months

In 7 months, 1 female: 240100000000

Greater Wax Moth
Gelleria mellonella

→ Financial damage!

↓

CONTROL!

Control of *Gelleria mellonella*

- Sulphur dioxide, acetic acid, formic acid, methyl bromide aluminum phosphide, phosphine gas, magnesium phosphide, para dichloro benzene (PDCB) and more...


ΕΙΔΗΣΕΙΣ | ΕΛΛΑΔΑ | ΚΟΣΜΟΣ | ΠΟΛΙΤΙΚΗ | ΟΙΚΟΝΟΜΙΑ | ΣΠΟΡ | ΑΠΟΨΗ | ΠΟΛΙΤΙΣΜΟΣ | ΨΥΧΑΓΩΓΙΑ

> Ελλάδα > Κοινωνία

Έλεγχοι στην αγορά

Αρχισε η απόσυρση των επίμαχων ποσοτήτων μελιού από την αγορά

Εντατικοί έλεγχοι άρχισαν στην αγορά από το πρωί της Δευτέρας για την απόσυρση όλων των τύπων μελιού στους οποίους εντοπίστηκε η καρκινογόνος ουσία παραδιχλωροβενζόλιο σε ποσότητες πάνω από το όριο ανίχνευσης που έχει θέσει η Ευρωπαϊκή Ένωση.


> Ελλάδα > Κοινωνία

Αποσύρονται οι επίμαχες ποσότητες

Χωρίς πρόβλημα η παραγωγή μελιού του 2005, συμφωνούν ΥΠΑΝ και μελισσοπαραγωγοί

Στην απόσυρση του μελιού παραγωγής 2004, εφόσον έχει πάνω από 10 μικρογραμμάρια κηροσκορίνης, συμφώνησαν οι παραγωγοί μελιού και ο υφυπουργός Ανάπτυξης Γ.Παπαθανασίου, ενώ διαβεβαίωσαν πως η παραγωγή του 2005 δεν έχει κανένα απολύτως πρόβλημα.

- Alternatively: freezing manipulation of frames (-18^{o} C)

Control of *Gelleria mellonella*

- Approved for organic apiculture: *Bacillus thuringiensis* (BT) products

PRESENT STUDY

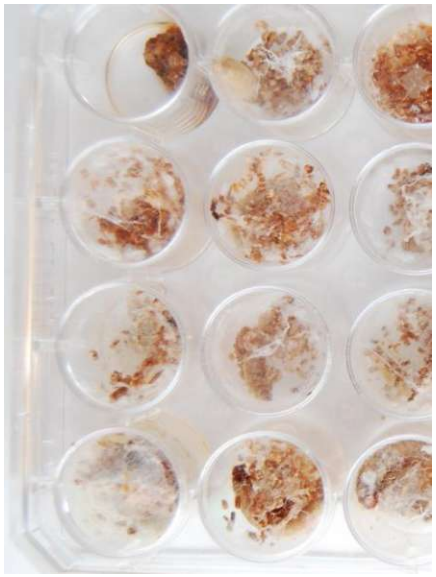
- To assess the efficacy of *Bacillus thuringiensis* new formulations during laboratory, semi-field and field trials against the larvae of the greater wax moth

- To assess the impact of these BT products to honeybees during cages tests and apiary trials

LAB TESTS

➢ METHODOLOGY

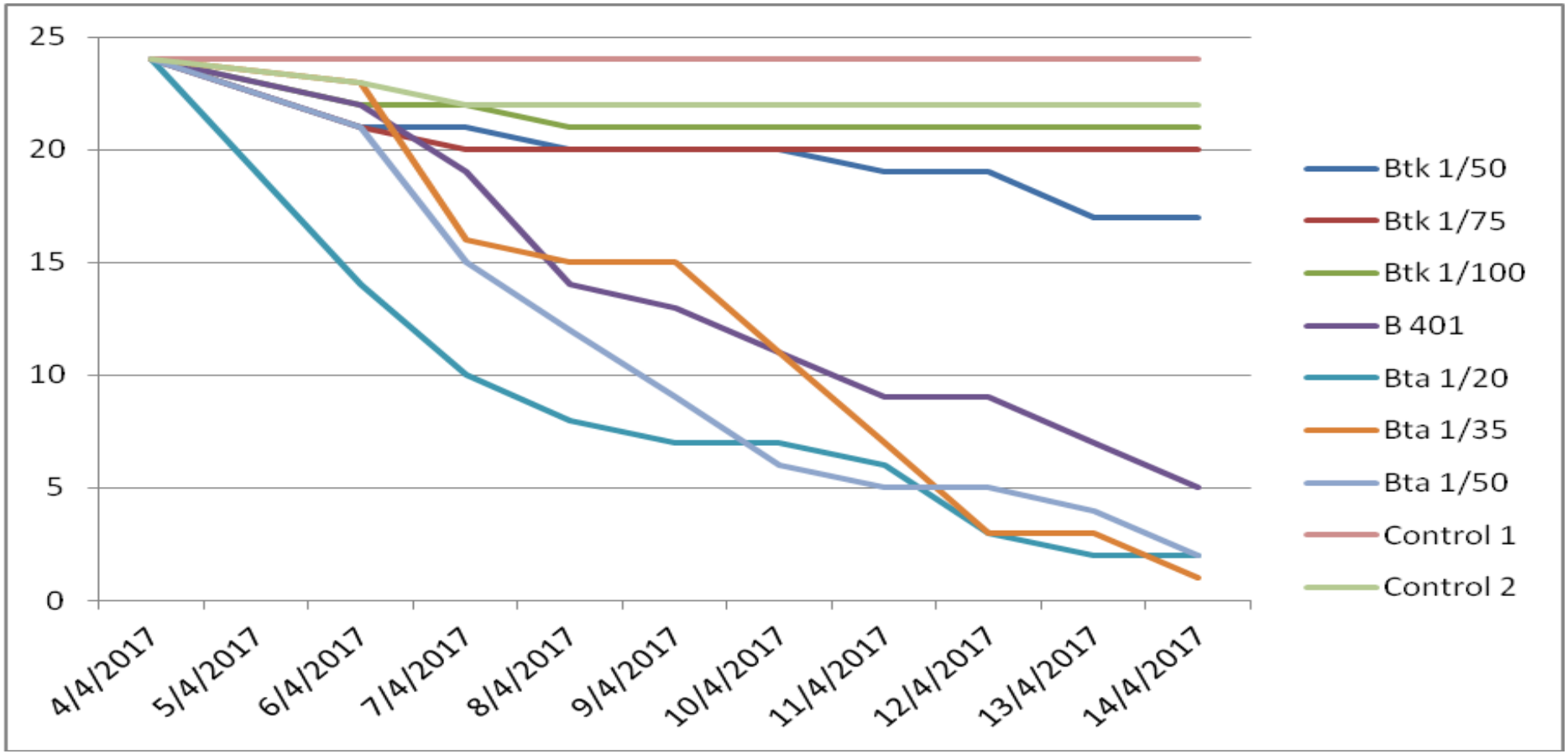
7 days old larvae (n=432), of around 0.2 mg, were fed on artificial diet containing different concentrations of BtA, BtK and B401. Isolation of each larvae into wells of a 24 well plastic tissue culture plate



(Burges,1976; Hanley et al. , 2003)

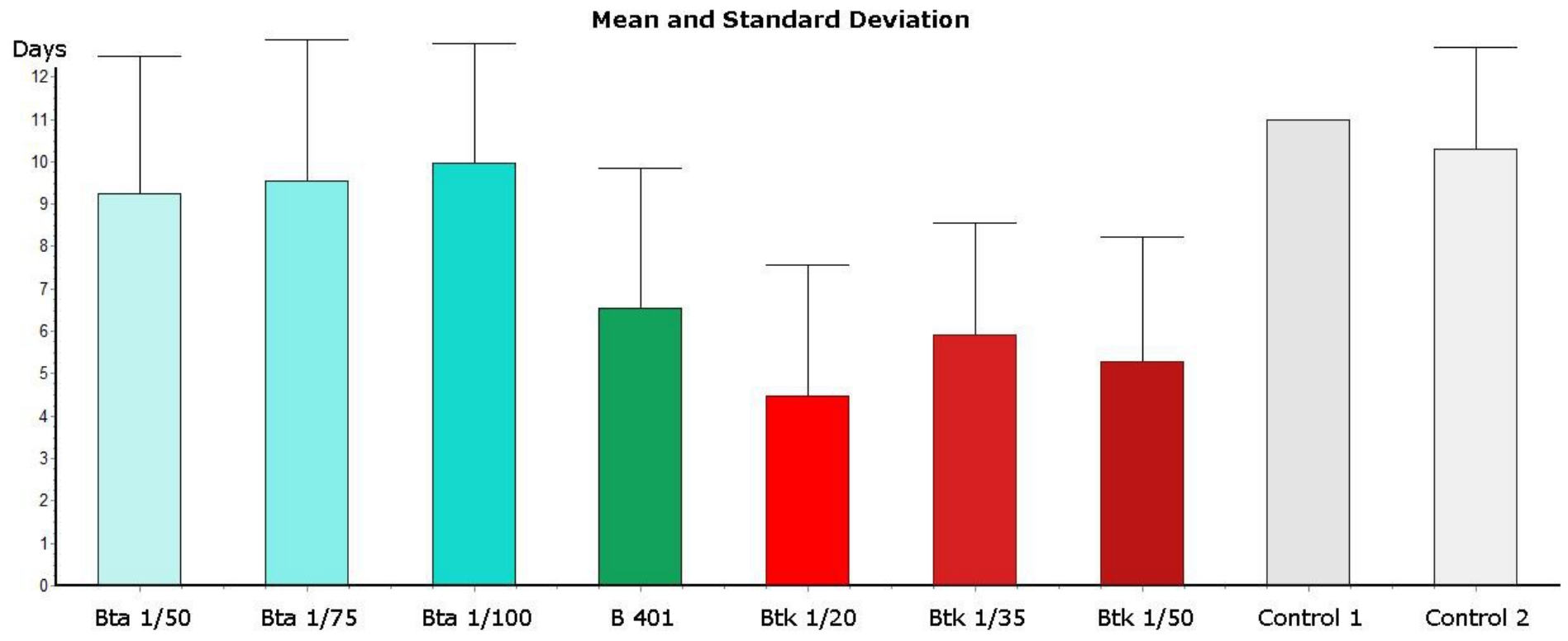
LAB TESTS

➢ Results



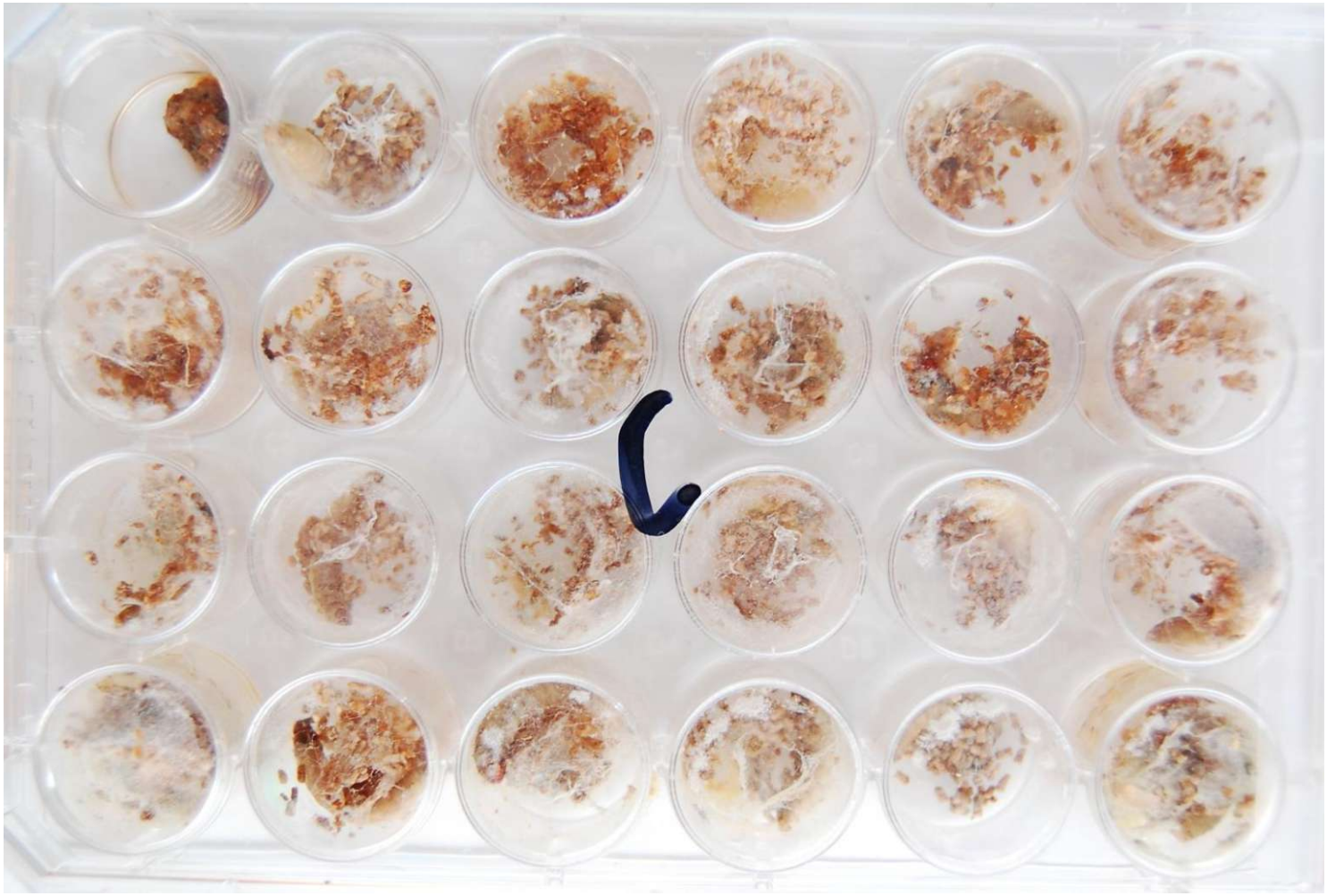
LAB TESTS

➢ Results

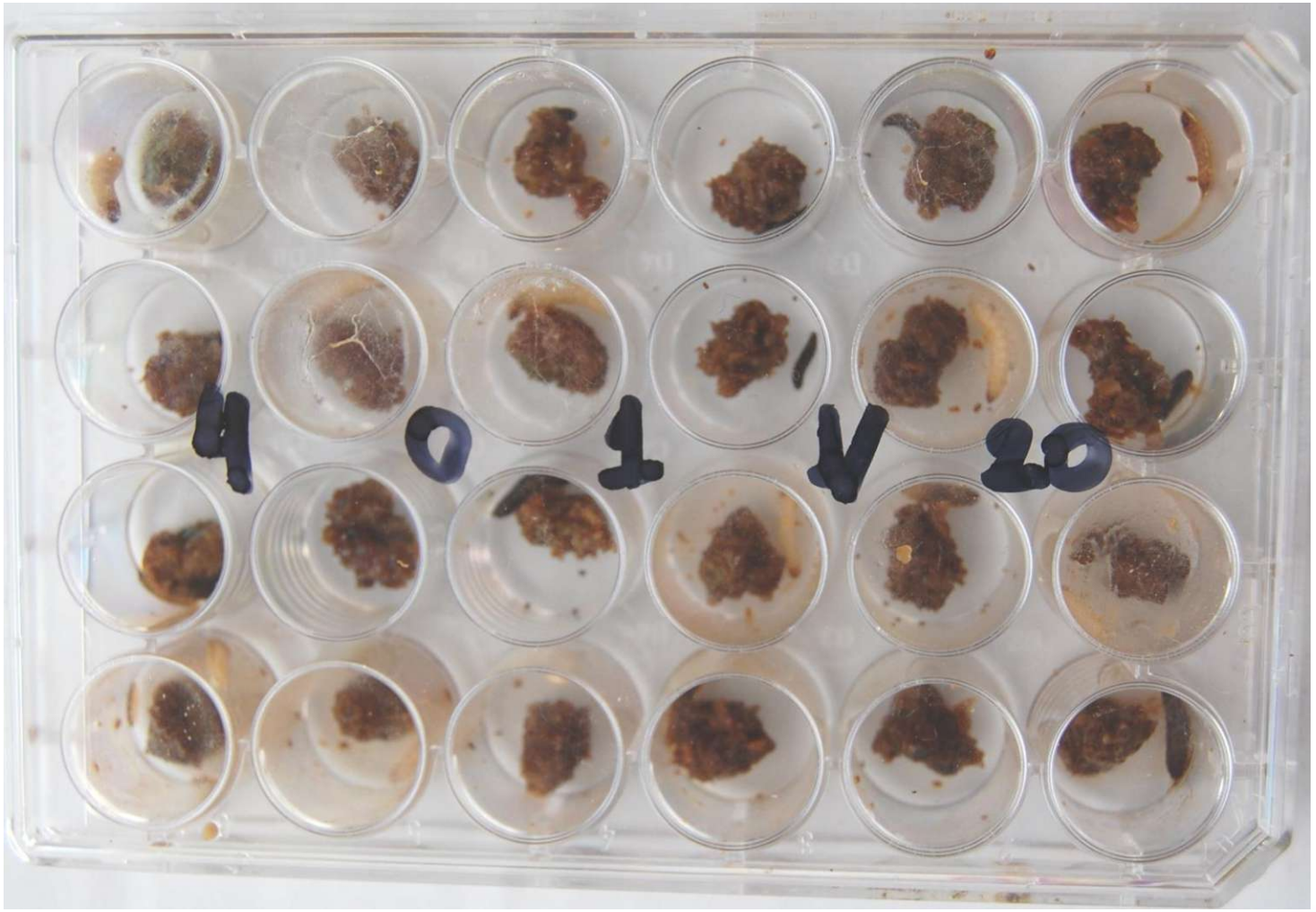


Suspension of wax moth survival rate after products' application

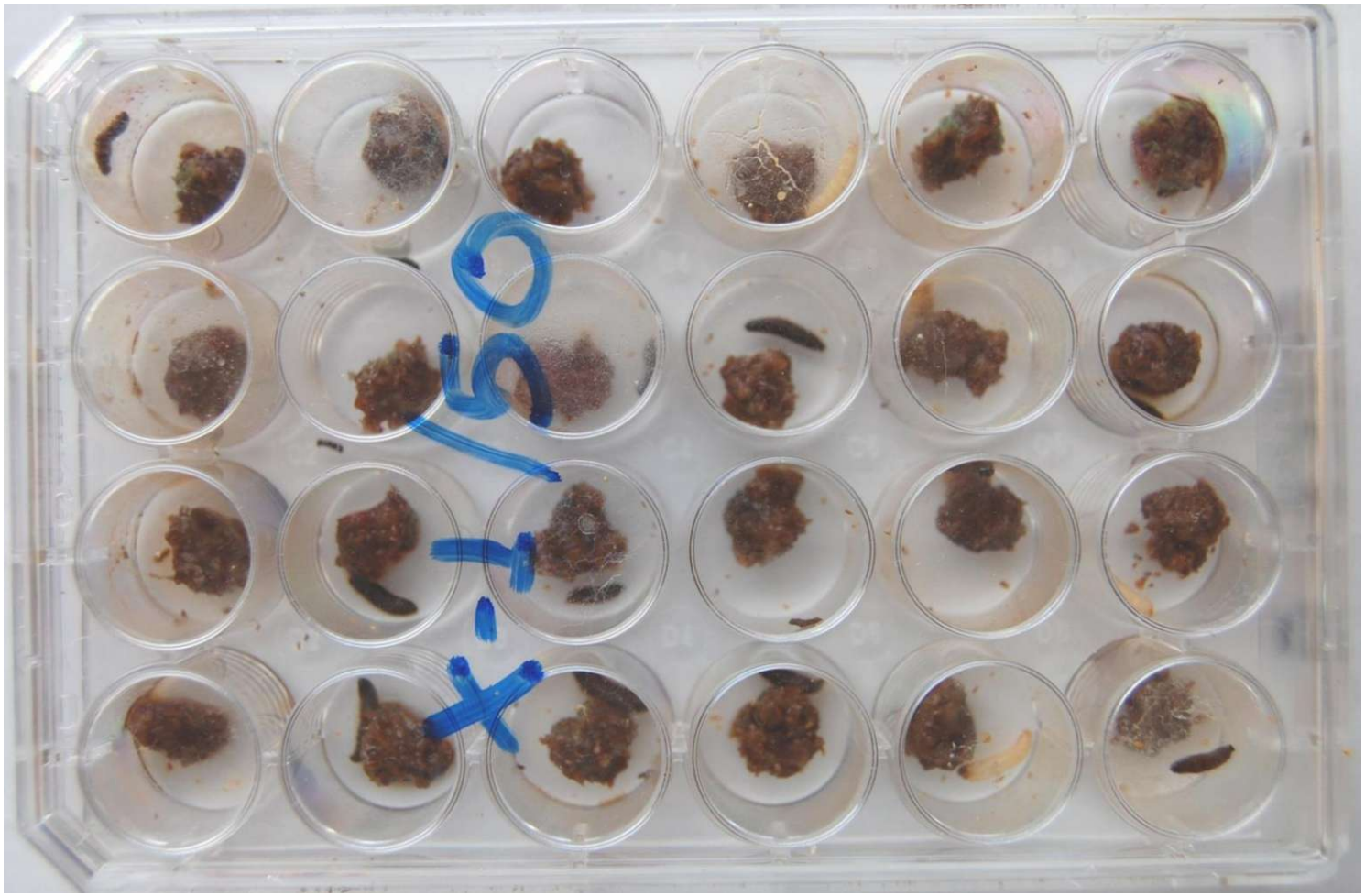
Control



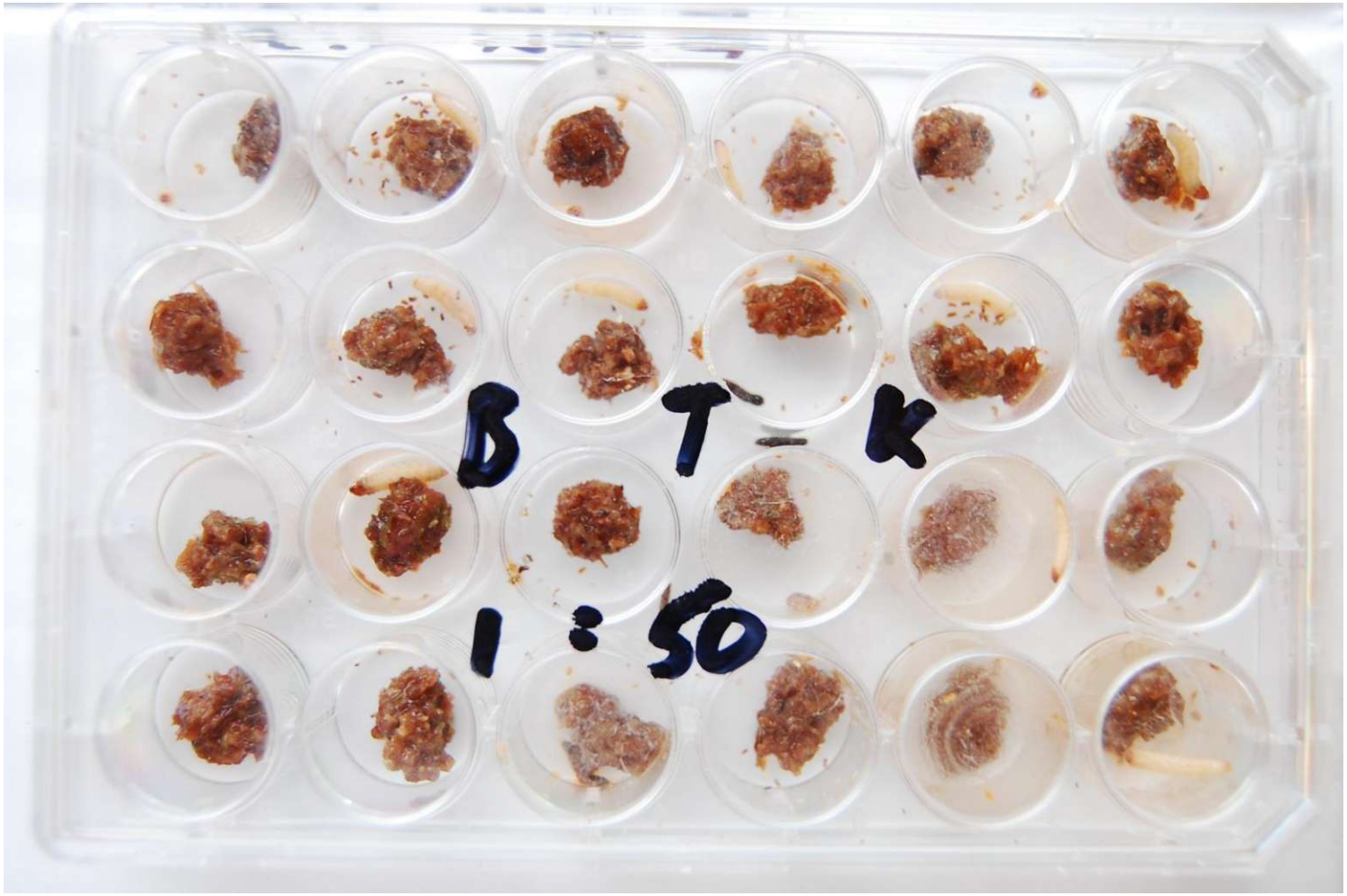
B401



BtA



BtK



Results

- BtA appeared to be very effective killing even more wax moth larvae than B401
- BtK induced significantly lower efficacy and mortality of larvae did not differ compared to control
- However, all applications, including Btk, resulted in limited ability of survived wax moth larvae to spin cocoon and enter pupation

SEMI-FIELD TESTS

➢ METHODOLOGY

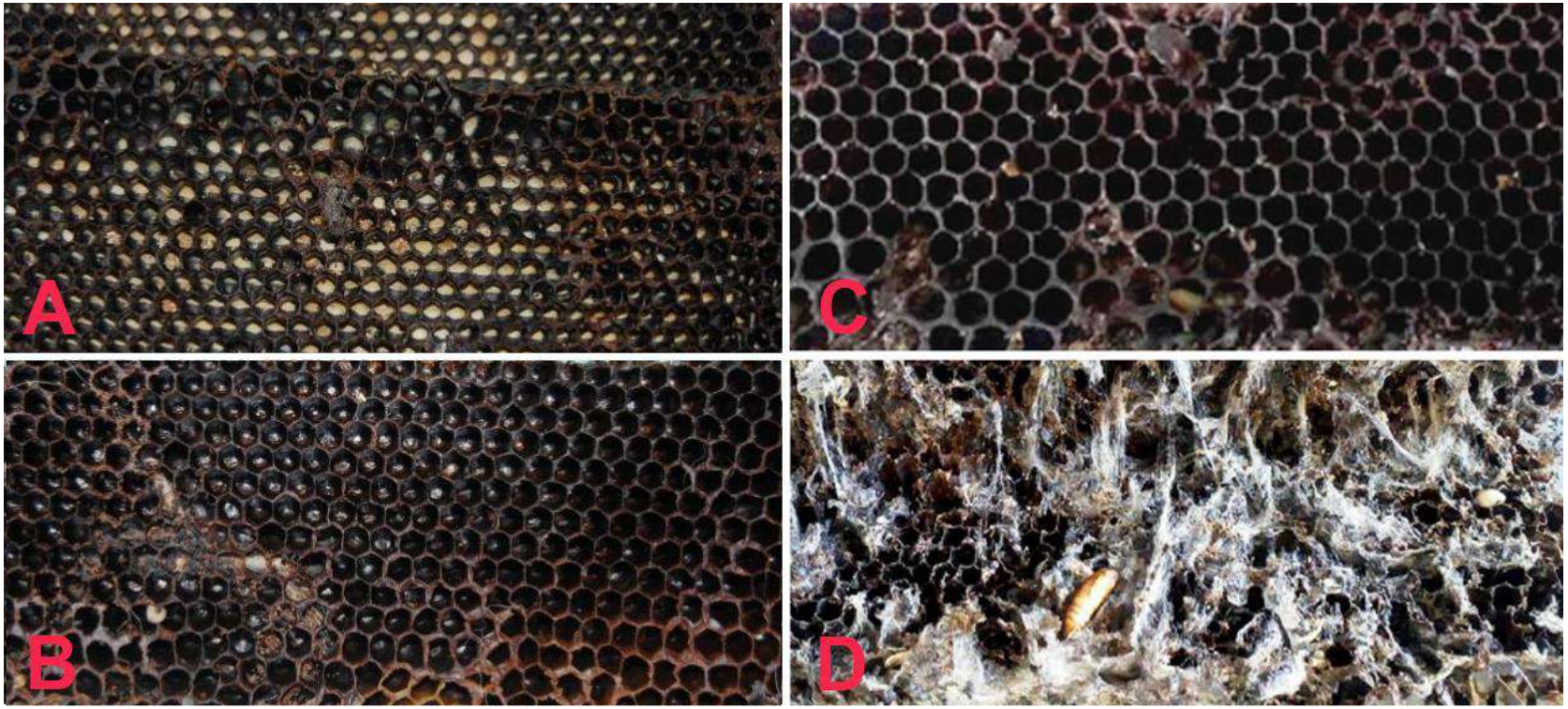
- Bees-wax comb frame (10cm x 10cm) was sprayed with the treatment until the point of run-off. The frames were placed in containers and were laid horizontally.
- 3rd instar larvae (n=360) were used for the trials, divided in 6 batches of 60 larvae each. They were introduced to the comb frames and were paced in incubator.
- Area of destroyed frame as well as number of dead larvae were recorded daily

(Brighenti et al. 2005)

Results

	Btk 1:12.5	Bta 1:17.6	B401	control
Cells	2380	2426	2532	2450
Damaged cells	280	21	12	All
Undamaged area %	**88,23%**	**99,13%**	**99,52%**	**0%**
Dead wax moth larvae	39	58	58	2
Efficacy	**65%**	**96,66%**	**96,66%**	**3,33%**

Results



A: BtA. B: BtK, C: B401, D: Control

CAGE AND FIELD TESTS

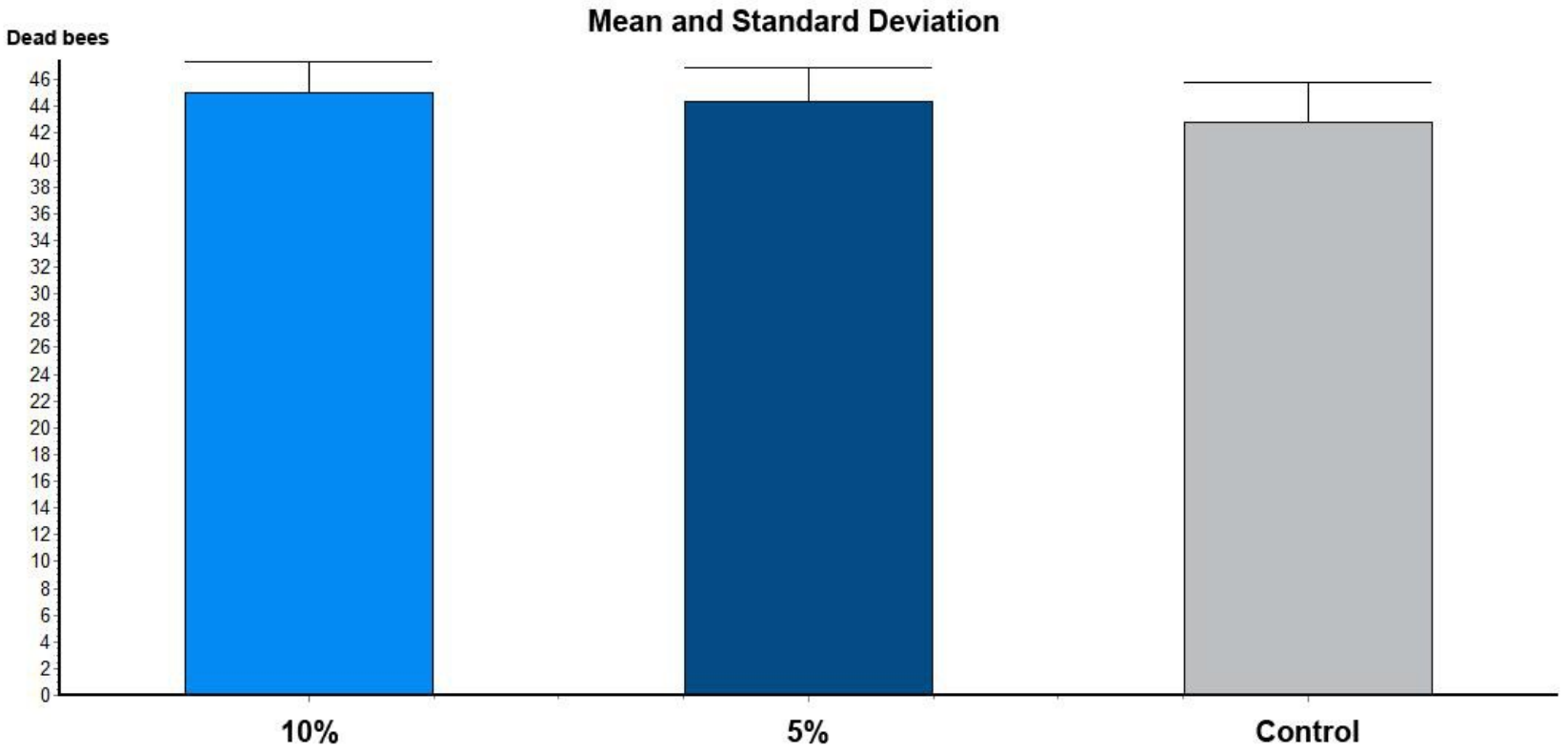
➢ METHODOLOGY

• Bees-wax comb frames were sprayed with the treatment until the point of run-off. The frames were placed in suppers and were attached over colonies (n=40). Control frames were sprayed with water.

• Pieces of 5x5 wax combs were paced in cages containing 100 encaged honeybees each (total 1500 bees).

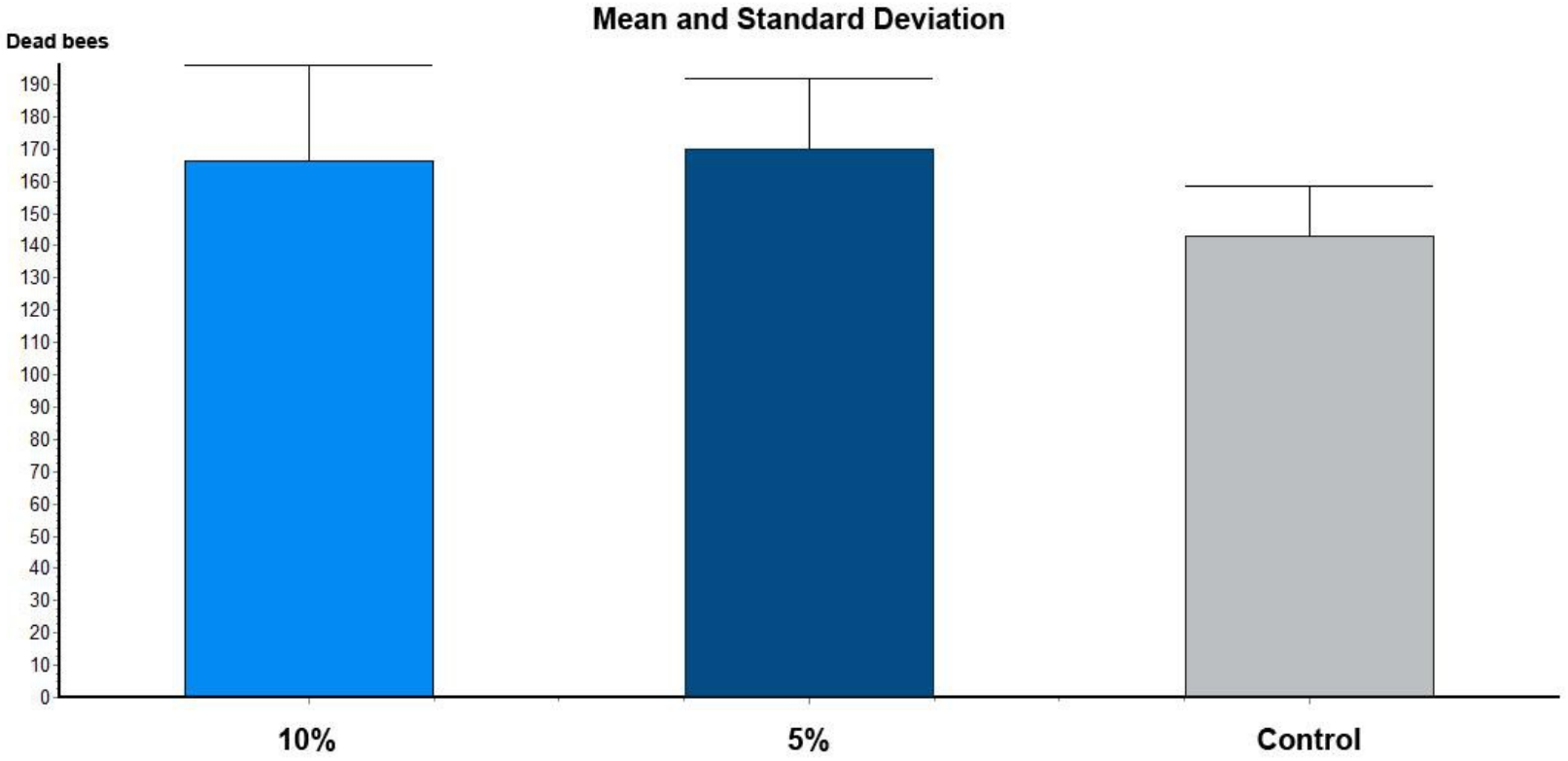
• Dead bees were counted daily.

Results - Cages



*over 20% dead bees per treatment

Results - Colonies



CONCLUSIONS

- The new formulations of *Bacillus thuringiensis* appear to be effective against the larvae of greater wax moth
- BtA appeared to be the most effective. Efficacy was higher than B401 though differences were not significant
- It appears to be totally safe for bees

Advantages

- Safe
- Effective
- It is suitable for organic apiculture
- The mode of application is expected to be more simple compared to B401 (immersion of suppers instead of spraying frames)

Bon Appetit

Acknowledgements