



Beneficial insects against pests in stored products

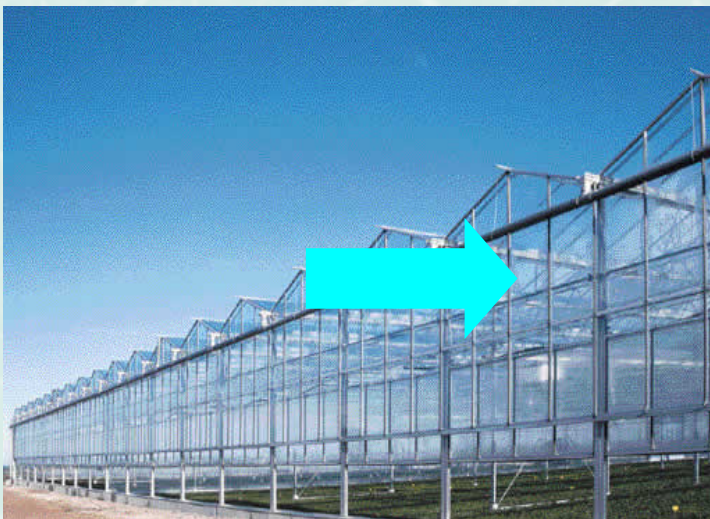
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Background



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Project and trial phase 2006 - 2008

Partners



Objective:

- Mass-Production of beneficials
- Definition of application strategy in storehouses and manufacturing facilities in Switzerland

Beneficials & host range

Anisopteromalus calandrae
Lariophagus distinguendus



Against Larvae of

- **Sitophilus spp.**
- **Stegobium paniceum**
- **Rhyzopertha dominica**
- **Lasioderma serricorne**
- **Ptinus tectus**
- **Gibbium psylloides**
- **Ptinus fur**
- **Sitotroga cerealella**
- **Coallosobruchus spp.**

Trichogramma evanescens



Against eggs of

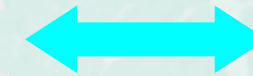
- **Ephestia spp.**
- **Plodia interpunctella**
- **Sitotroga cerealella**
- **Tineola bissliella**

Habrobracon hebetor



Against larvae of

- **Ephestia spp.**
- **Plodia interpunctella**
- **Sitotroga cerealella**



Biology in brief



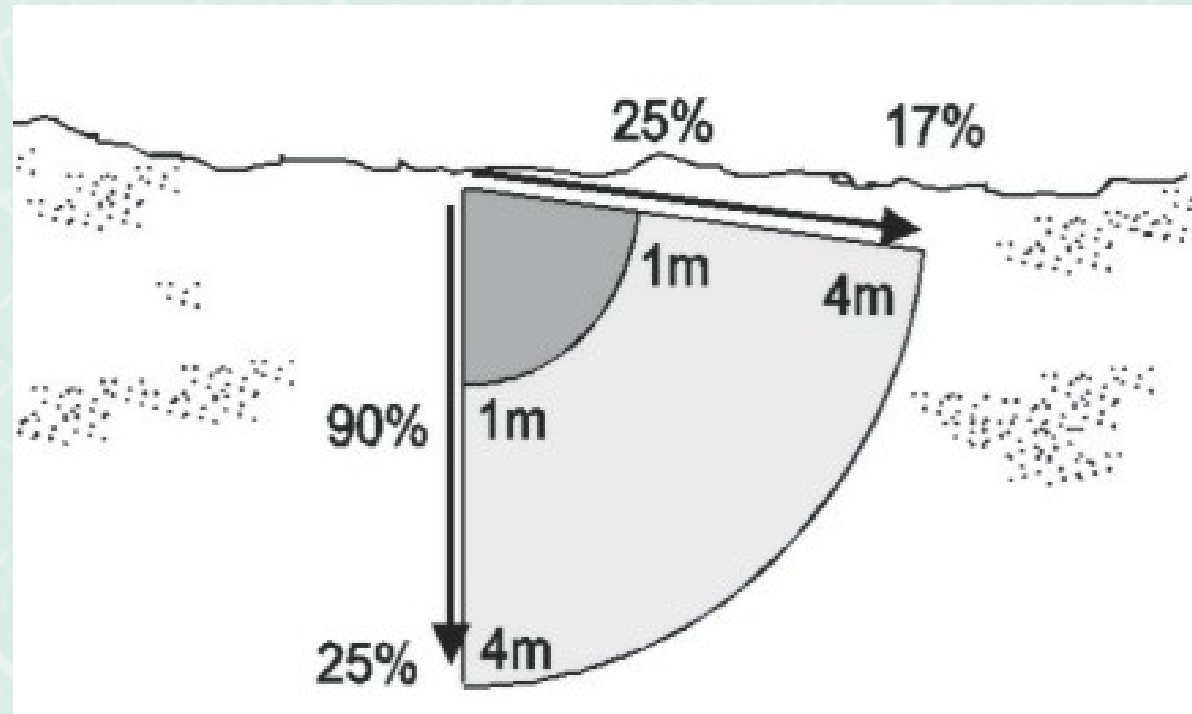
Anisopteromalus calandrae / *Lariophagus distinguendus*

- Ectoparasite
- Strong host recognition through kairomones
- Range: > 25 m horizontally, 4 m deep into wheat grain layer
- Temperature: 17°C - 34°C
- Application rate:
0.5 – 3 insects / 1 m²
- Interval of 3 – 4 weeks



präsentiert

Lariophagus distinguendus Host finding ability



% of retrieved *Lariophagus distinguendus* in wheat silo cell

Steidle und Schöller, 2002

Biology in brief

Trichogramma evanescens



- Endoparasite
- Size: 0.3 mm
- Horizontal range: up to 7 m only on smooth surfaces
- Temperatures 15 – 35°C
- Application rate:
20 – 360 insects / m²
- Interval of 2 weeks



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Biology in brief

Habrobracon hebetor



- Ectoparasite
- Strong host recognition through kairomones
- Range: > 50 m horizontally
30 cm into grain layer
- Temperature: > 15°C, Optimum
25 – 30°C, Max. 44°C
- Application rate:
0.5 – 4 insects / m²
- Interval of 2 – 4 weeks



Trial sites 2006 - 2008

- 2 Silos
- 3 Store houses
- 2 Storage rooms
- 2 Pasta factories
- 2 Mills
- 1 Industrial bakery
- 1 Office



Example 1

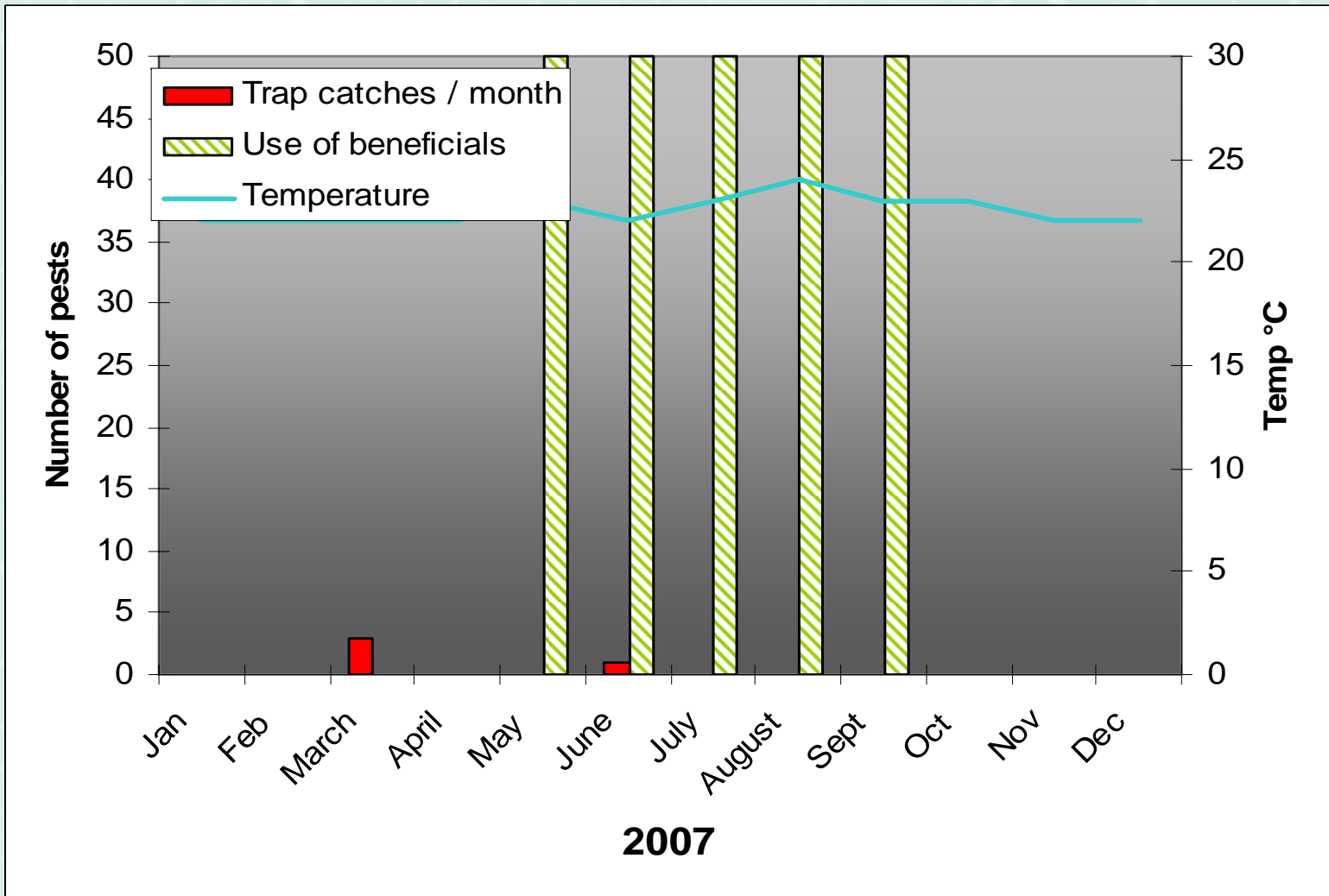
Industrial bakery

Rooms	200m ² + 800m ²
Pest	Indianmeal moth <i>Plodia interpunctella</i>
Beneficial	<i>Trichogramma evanescens</i>
Application	10 x 60 cards, 2 weeks interval
Time	May - October



Monitoring data 2005 – 2007

Industrial bakery



Example 2

Pasta factory

Rooms

10.000 m³ + 11.000 m³

Pests

Drugstore beetle *Stegobium paniceum*

Lesser grain borer *Rhyzoperta dominica*

Beneficial

Anisopteromalus calandrae

Application

12 x 40 units, 4 weeks interval

Time

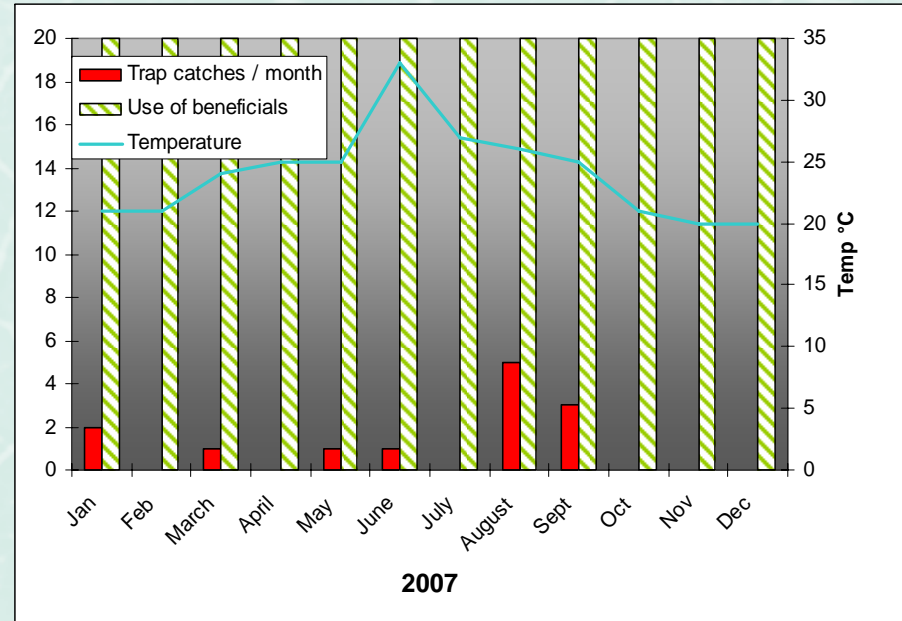
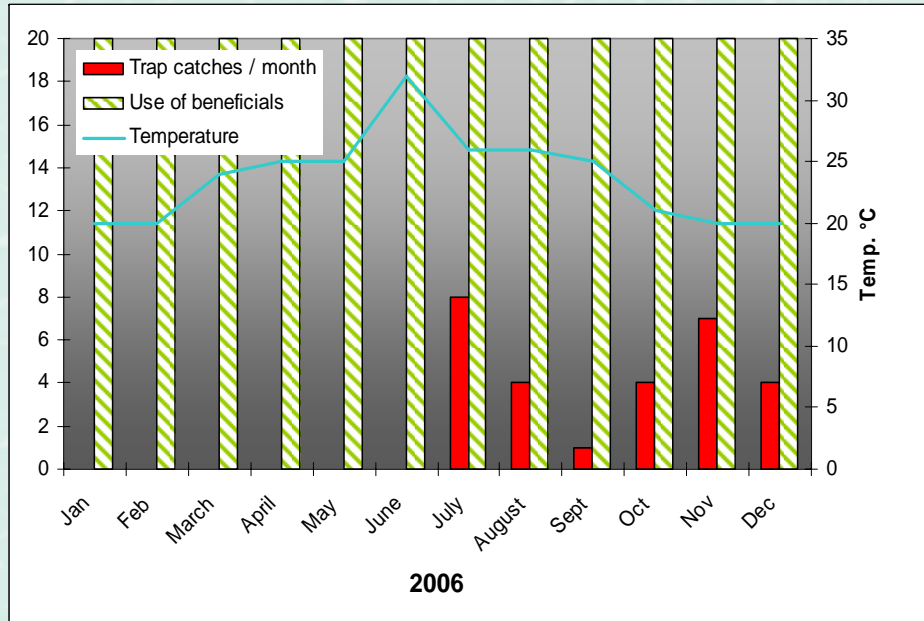
Whole year

Use of beneficials in pasta factory



Monitoring data 2006 – 2007

Pasta factory



Summary of trial results

- 2006: 4/8 trials needed no chemical treatment
- 2006: 3/8 trials needed only punctual chemical treatment
- 2006: 1/8 trial had to be stopped

Conclusion

- 200
 - 200
- Excellent tool as additional method for IPM approach in storage protection**
- 2008: 8/9 needed no chemical treatment

Advantages of using beneficial insects in storage protection

- ✓ Highly efficient, as proved in fiel trials over 3 years
- ✓ Cost-effective
- ✓ No chemical residues
- ✓ Safe for the environment and the user
- ✓ Operations need not be stopped when using beneficials
- ✓ Option for extending an anti-resistance strategy
- ✓ Beneficials exclusively parasitize their host organisms and only survive as long as their host is present

Thank you for your attention

