



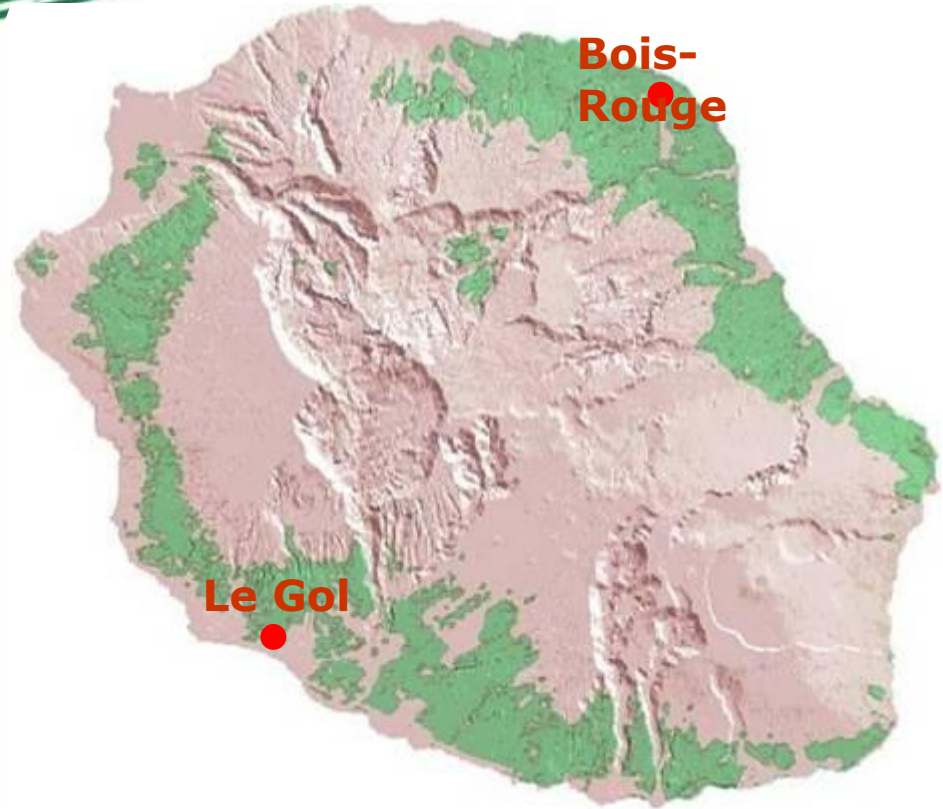
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Biocontrol of *Chilo sacchariphagus* on Reunion Island: impact of a cold storage on the efficacy in the field of egg parasitoid *Trichogramma chilonis*.

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Goebel, E. Roux



Context Reunion Island and Sugarcane



25,000 ha, 2 sugar plants



Spotted stem borer
Chilo sacchariphagus



Cycle 60-70 days
 at 25°C

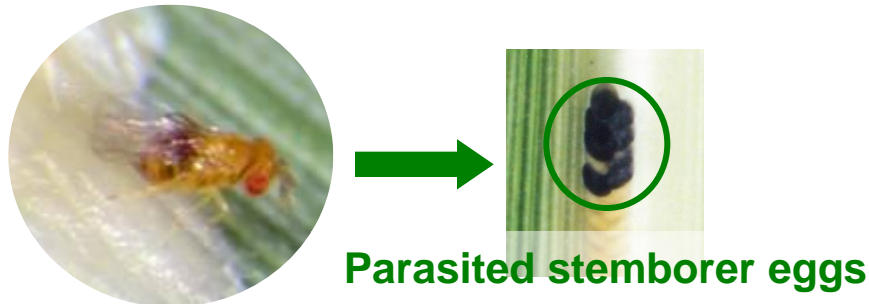


- Productivity loss
 - Insecticide trials: up to 40 tonnes /ha in severe infestation (Goebel, 1999)
 - Field surveys: at 70% of attacked stems (1/3 s/cane surface) 15 tonnes /ha (Phelippeau, 2007)
- Negative impact on quality sugarcane extract

10 000 ha are at medium or high infestation risk area

Biological control by *T. chilonis* – History and first results in field

- 2000 to 2001 - Biocontrol agents inventory (Inra-Cirad)
 → *Trichogramma chilonis*, a egg parasitoid



- From 2001 - small production unit at FDGDON on *G. mellonella*
- 2001 to 2003 - first field trials

100 000 *T. chilonis* /ha /week during 4 month
 → 50% reduction of damages
 20% increase of cane yield
 Gain range 600 to 1400€ /ha

In field

- 2005 - reduction of release points density
- since 2007 – study focus on delayed emergences
- since 2008 – study on biodegradable dispensers which protect eggs from predators

Insect production

- 2008 - change of host : *Ephestia kuehniella*
→ Better quality of *Trichogramma*
- since 2009 - Biotop SA produces *Trichogramma* sent to Reunion in cool boxes
- since 2008 – study on storing possibilities

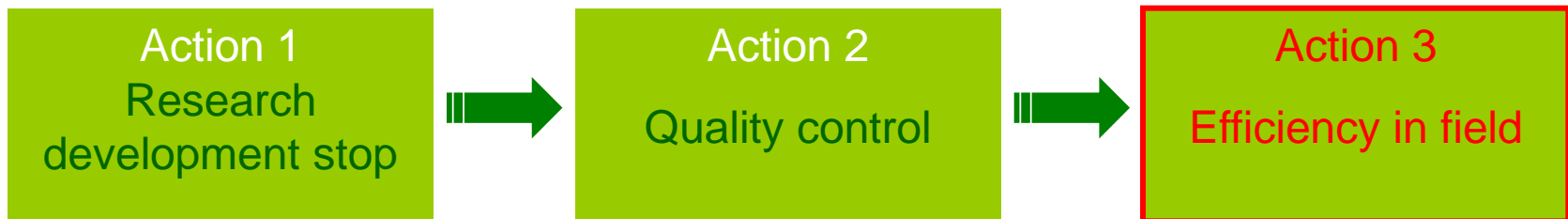
Advantages of storage at cold temperature

At production level

- Better management of sites and staff
- Increase of production capacity
- Improvement of insect quality

At field level

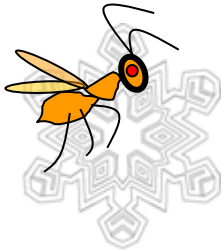
- Improvement of the insect availability
- Reduction of the releases number (delayed emergences)



Aim: does cold storage affects the efficiency of *Trichogramma* in the field?



- Reference : non stored *Trichogramma* releases



- Cold storage : cold stored *Trichogramma* releases

For both “Reference” et “Cold storage” treatments,

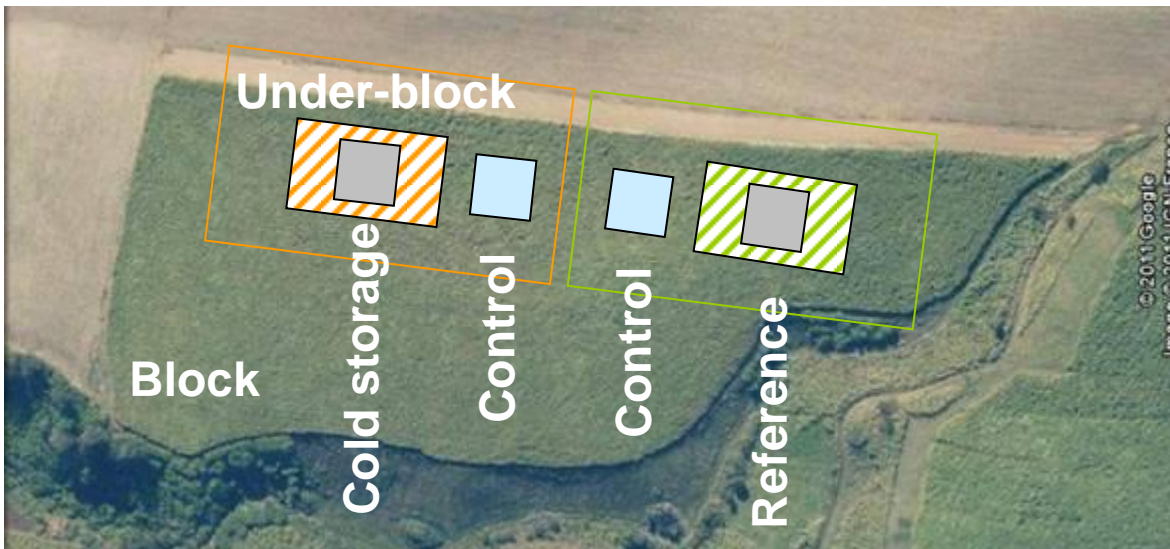
- 16 releases of 100 000 wasps /ha /week

during 4 months

- 1 control plot: no release



Experimental plan on 5 sugarcane fields, R579 variety, in high infested area



Release plot
2500 m²

with

25 dispensers /plot



Observation square
700 m²

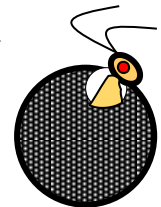
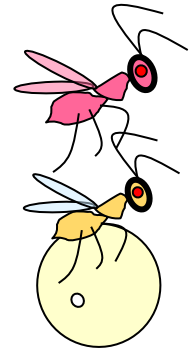
Releases of *Trichogramma* - organization

Trichogramma sent by plane every 2 weeks ONLY from France to Reunion.

Organization for releases every week				
Treatment	Release after reception	Cold storage 2 months at 3°C	Storage 1 week at 15°C and 30% HR	Name
Reference	+ 1 day	No	No	R
	+ 8 days	No	7 days	Rs
Cold storage	+ 1 day	Yes	No	C
	+ 8 days	yes	7 days	Cs

In laboratory

- Longevity : % ♀ alive
- Fecundity : number of parasitized eggs
in 7 days on 30 females
- Emergence rate : emerged eggs on 100
parasitized eggs × 5 dispersers /treatment / week



In field

- Emergence rate : emerged eggs on 100
parasitized eggs × 5 dispersers /treatment /week
- Ants predation rate : predated eggs rate on all
dispensers



Measures : damage level and stalk mass at harvest

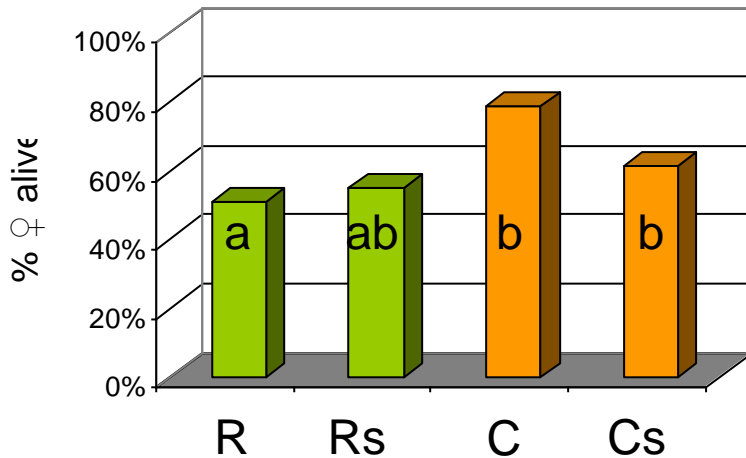
- Damage level : % internodes bored
- Stalk weight
on 100 canes sampled /plot



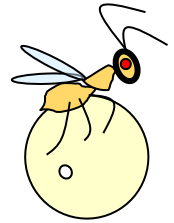
Longevity and fecundity of released *Trichogramma*



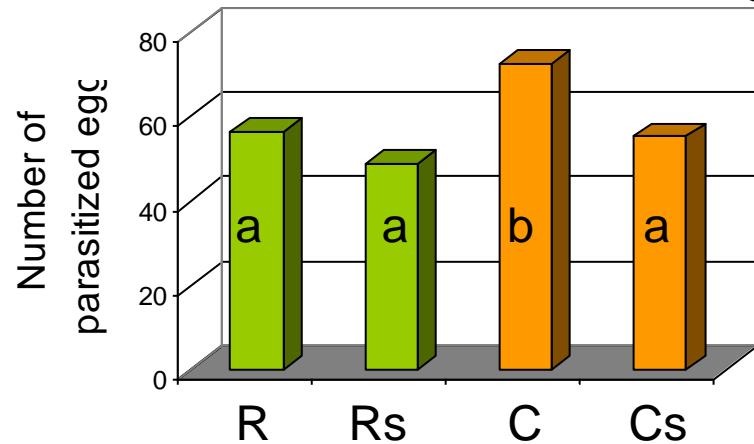
Longevity



Longevity of **cold stored** *Trichogramma* is better



Fecundity

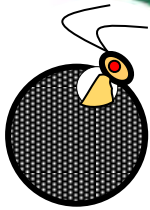


No impact of **cold storage** on fecundity

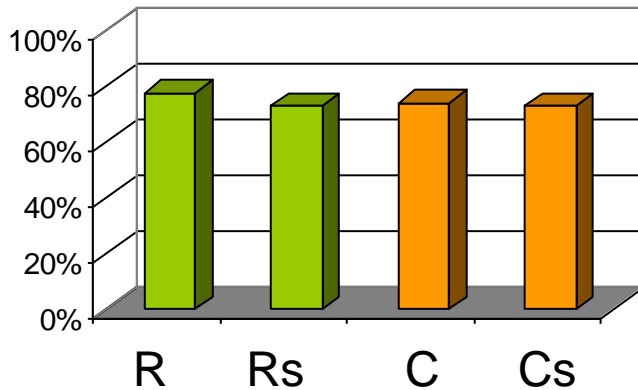
Small negative impact of storage at 15°C for **cold stored** *T.c.*



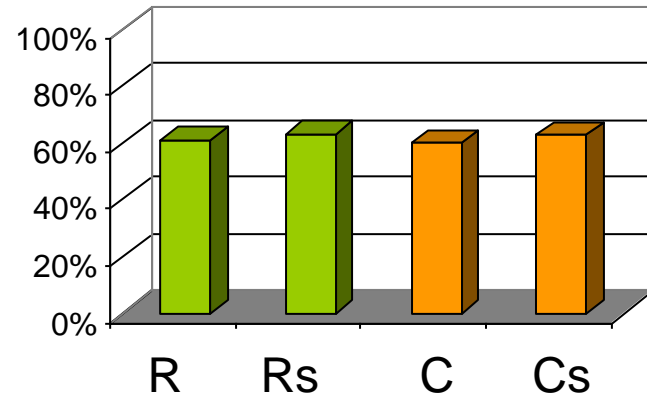
Emergence rate of released *Trichogramma*



Emergence rate in laboratory



Emergence rate in field



No impact of **cold storage** on emergence rate

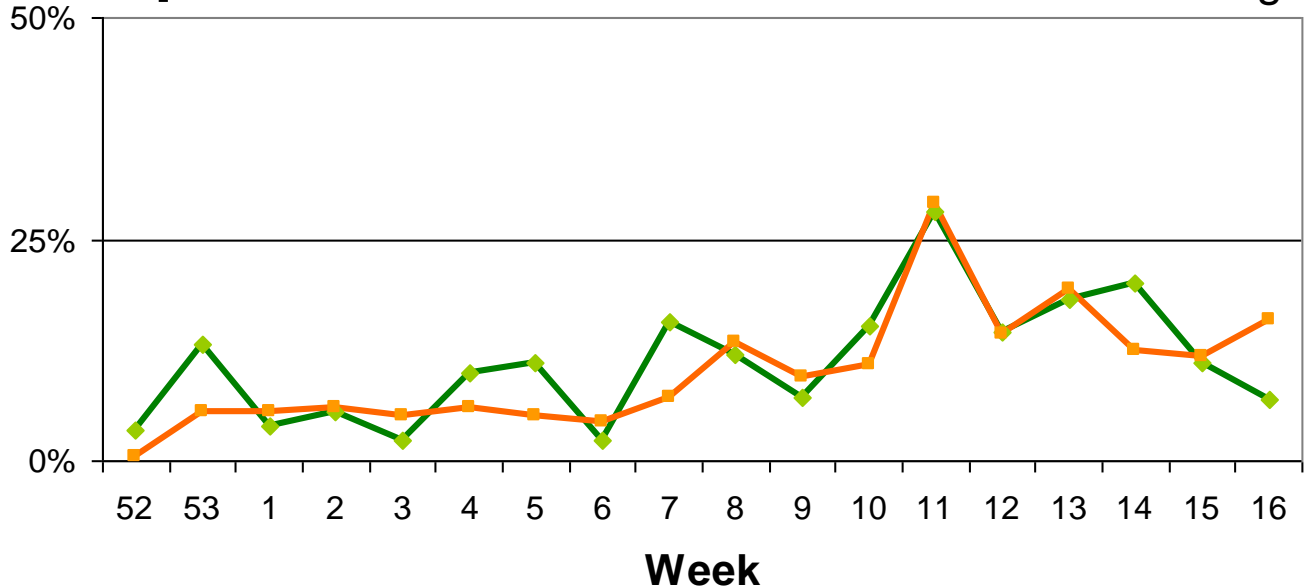
Emergence rate in field is low

→ transport to the fields

→ summer T°C (up to 40°C)



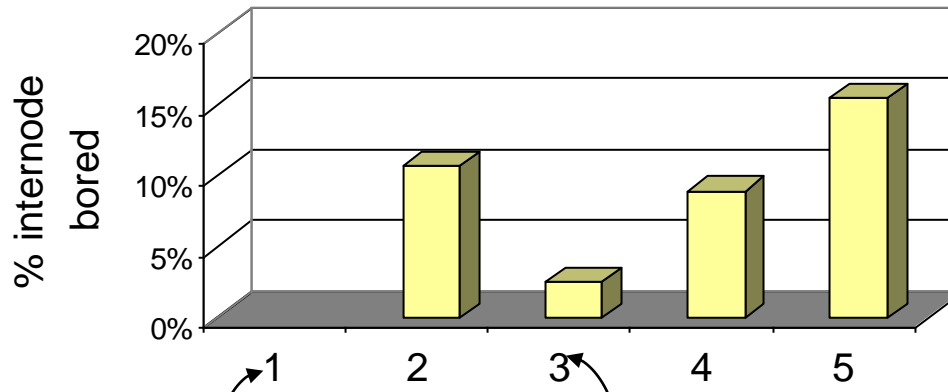
Ants predation rate ◆ Reference ■ Cold storage



Insect proof bags keep predation rate at a low level
 Predation rate seems to increase with sugarcane growth



Natural infestation on control plots

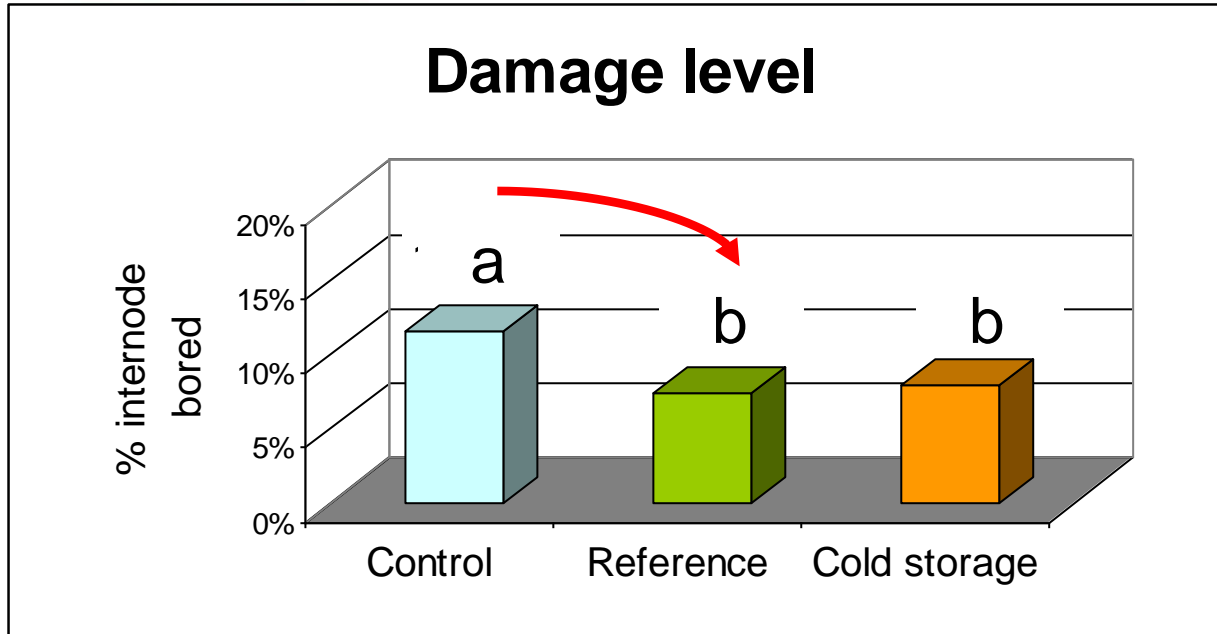


Field cut before observation

Natural infestation too low to measure biocontrol effect

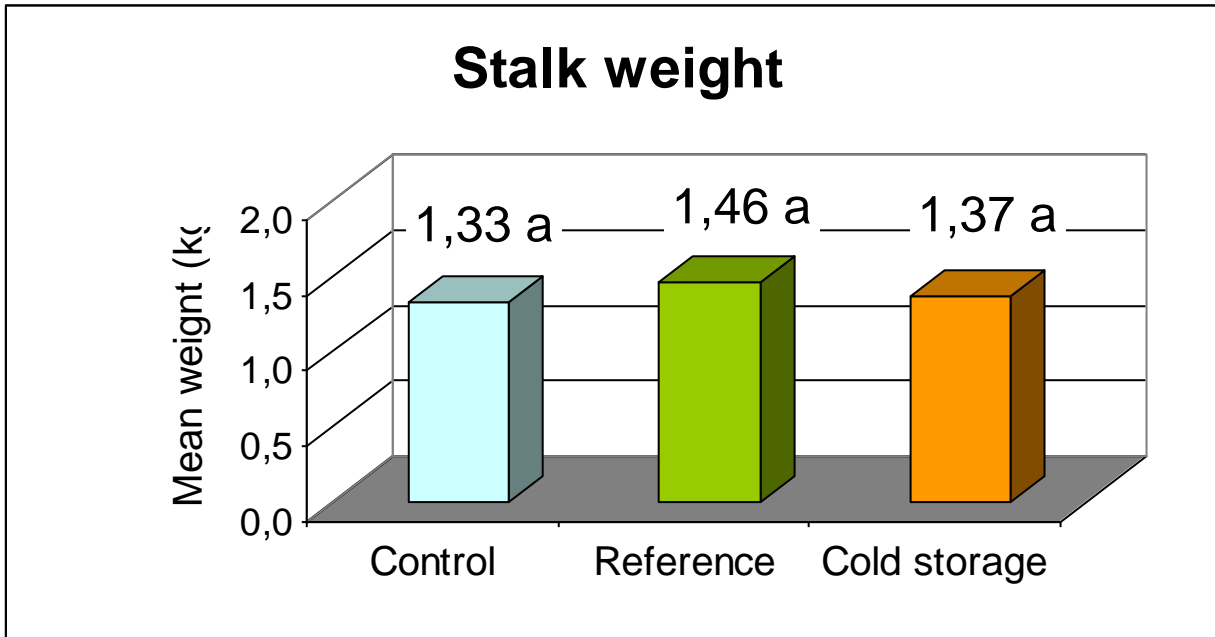
Fields 1 and 3 are not included in the analysis.

Treatment effect on damage level



Cold storage treatment is as effective as **Reference** treatment
 Reduction of 25% of damage level compared to the **Control** treatment

Treatment effect on stalk weight



No effect of treatments on biomass... ☹️





Conclusion

Conclusion and prospects

No negative impact of cold storage

- on quality of sent *Trichogramma*
- on reduction of damages in field

➔ Validation of cold storage for production process

Prospects : to decrease the number of releases





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Thank you for your attention.

Questions ?

