



***Trichogramma achaeae* as an IPM tool in tomato greenhouses**

PURE WP7 – Task 7.3b (Field trials)
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Tuta absoluta

- ❖ Invasive Lepidoptera, since 2008 in France
- ❖ High damages on Tomato



Tuta female laying eggs



Damages on leave and on fruit



Biological control with *Trichogramma achaeae*

- ❖ Micro-hymenoptera
- ❖ Egg parasitoid
- ❖ Ovicidal effect



Le Trichogramme pond un œuf dans celui du ravageur.

Il en éclôt une larve qui consomme le contenu de l'œuf.



Cette larve grandit.



Elle fabrique un cocon noirâtre en se transformant en nymphe.



Puis un adulte émerge et part à la recherche d'autres œufs.



❖ **Objective** : Demonstrate efficiency of *Trichogramma achaeae* use against *Tuta absoluta* in tomato greenhouses

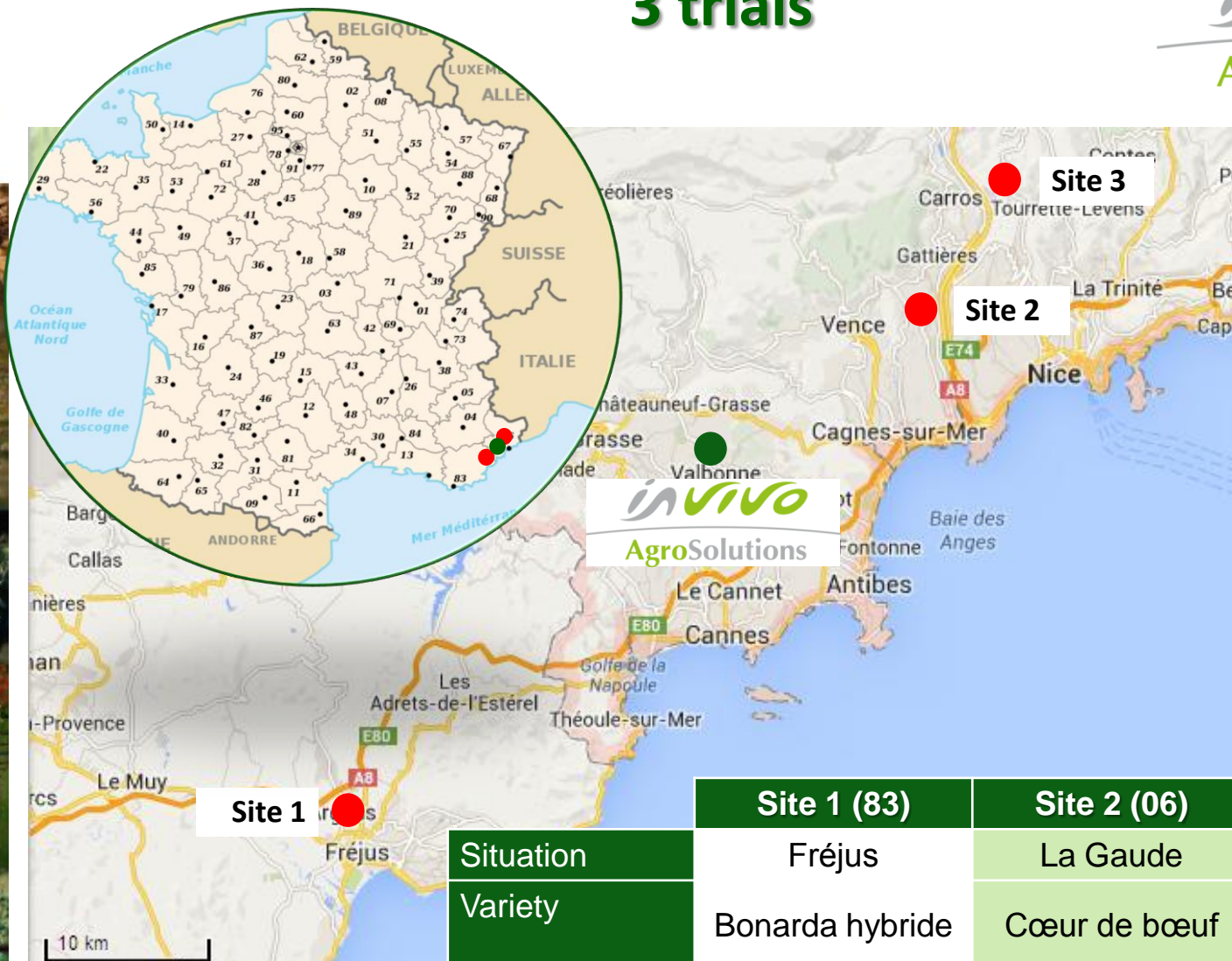
❖ **2 plots :**

- Farmer practices against Tuta, **without Trichogramma**
- Farmer practices against Tuta, **with weekly releases of Trichogramma**

❖ **Protocole :**

- 3 farms
- 2 plots by farm (200 à 400m² by plot)
- Trichogramma releases according to Biotop recommendations
- Every week, data collection on 30 plants /plots : damages on leaves and fruits, Macrolophus
- Adults trapping : 1 pheromon trap per plot





	Site 1 (83)	Site 2 (06)	Site 3 (06)
Situation	Fréjus	La Gaude	Saint Blaise
Variety	Bonarda hybride	Cœur de bœuf	Maestria + Fiorentino
Transplanting	March	April	April
Plot area	400m ²	150m ²	240m ²
Density	1 plant/m ² , 2 stems	0,8 plants/m ² , 2 stems	1,8 plants/m ² , 1 stem

Trichogramma achaeae releases

- ❖ Biotop product : **TrichoTOP TA**
- ❖ Releases according **Biotop** recommendations :

Recommendations	When ?	Dose
Prevention release	Beginning of culture : ➤ plants <10 leaves ➤ Mirid <10 / plant ➤ Adults trapping <30 / trap / week	250 000 Trichogramma /ha (100 dispensers /ha)
Safety release	Production : ➤ Mirid >3-5 / plant ➤ Adults trapping <50 / trap / week	500 000 Trichogramma /ha (200 dispensers /ha)
Curative release	High infestation of <i>Tuta absoluta</i> : ➤ Adults trapping >50 /trap / week	1 000 000 Trichogramma /ha (400 dispensers /ha)

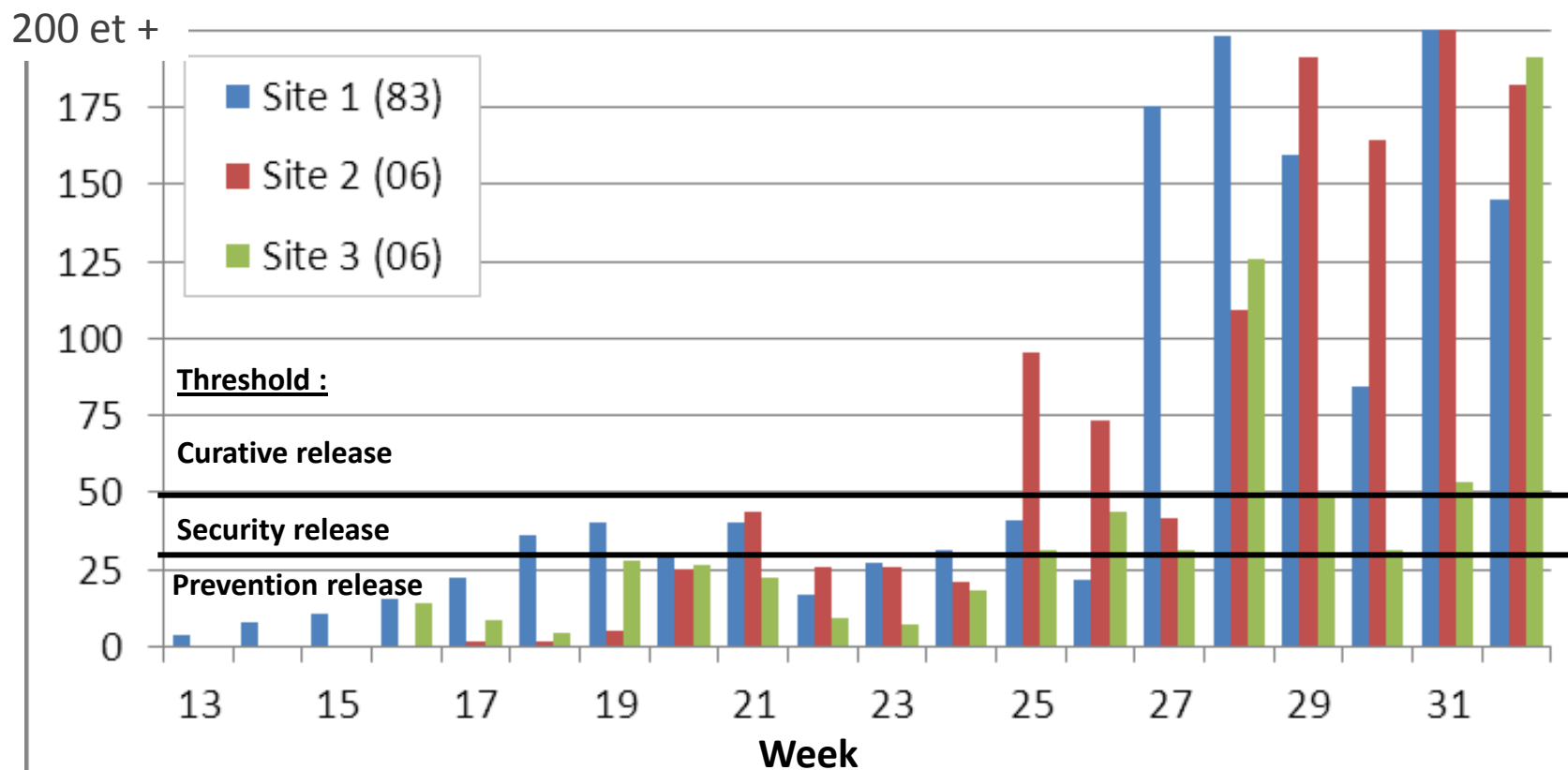


- Release each week as adults are trapped
- Minimum 100 dispensers / ha (1 dispenser / 100 m²)
- Possibility to add additional dispensers in areas where the pest attack is usually increased (entry points, warm areas)



Adults trapping

Tuta / trap
/ week

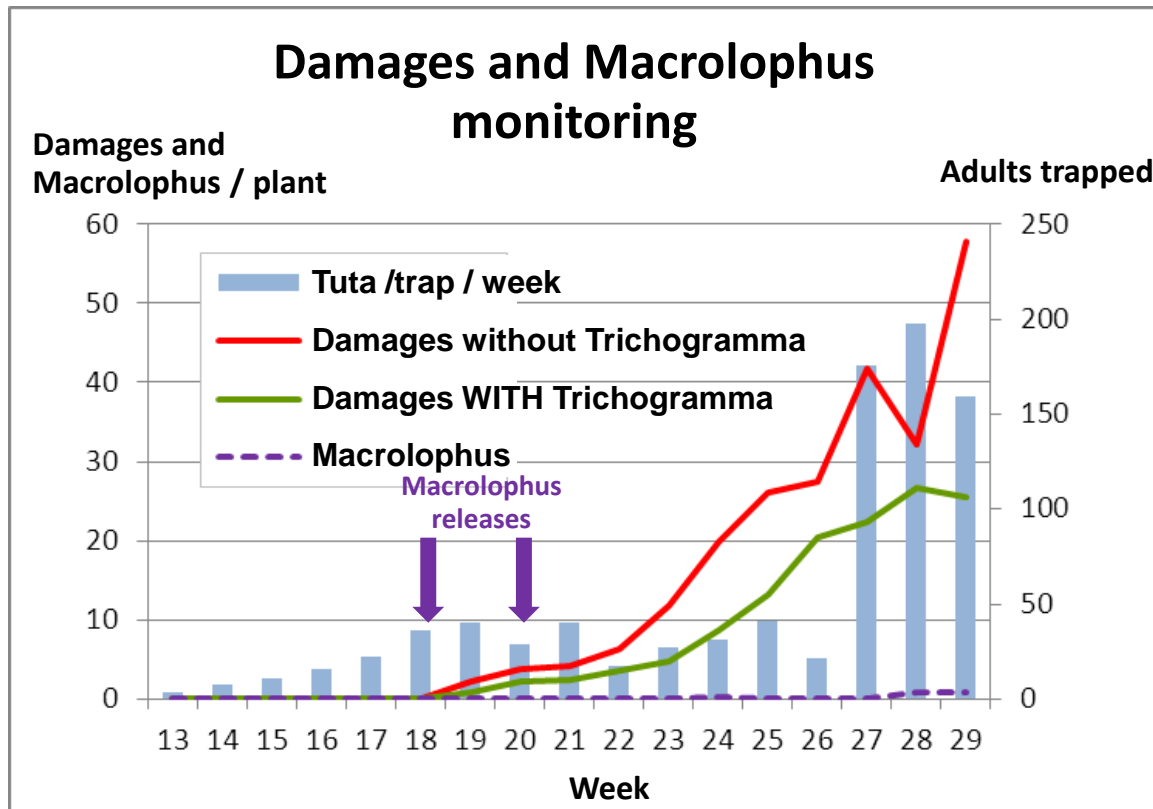




Population dynamics

Site 1 (83) :

- Farm in IPM
- Tuta : high pressure
 - Farmer practices / Tuta = Macrolophus + Bt
 - ➔ 9 Bt treatments from week 18 to week 28
 - ➔ No Macrolophus installation despite 2 releases



- ➔ Damages reduction by 2 with Trichogramma releases
- ➔ Positive effect, but insufficient in situation of high pressure and absence of Macrolophus

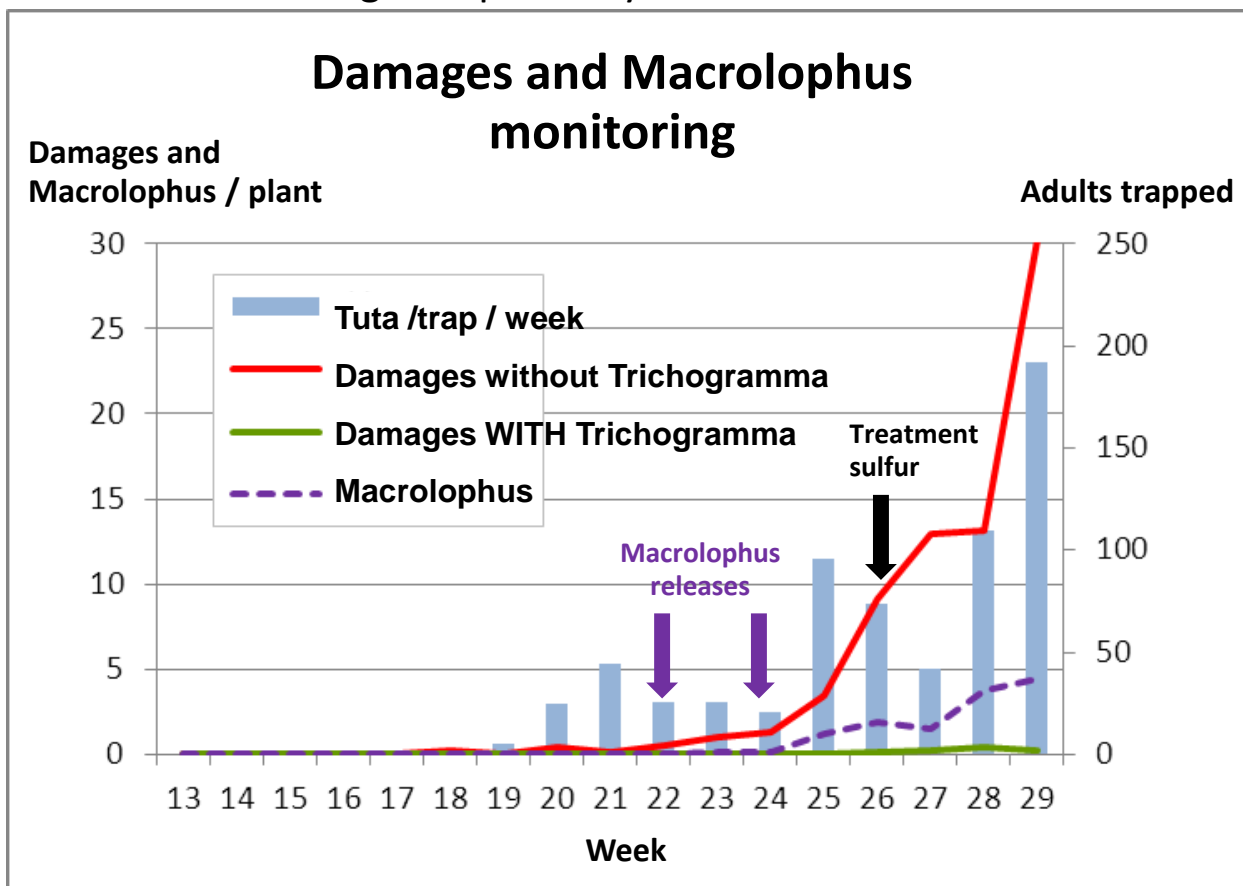


Population dynamics

Site 2 (06) :

- Farm in IPM
- Tuta : high pressure
- 1 sulfur treatment against powdery mildew

- Farmer practices / Tuta = Macrolophus
→ Good Macrolophus installation

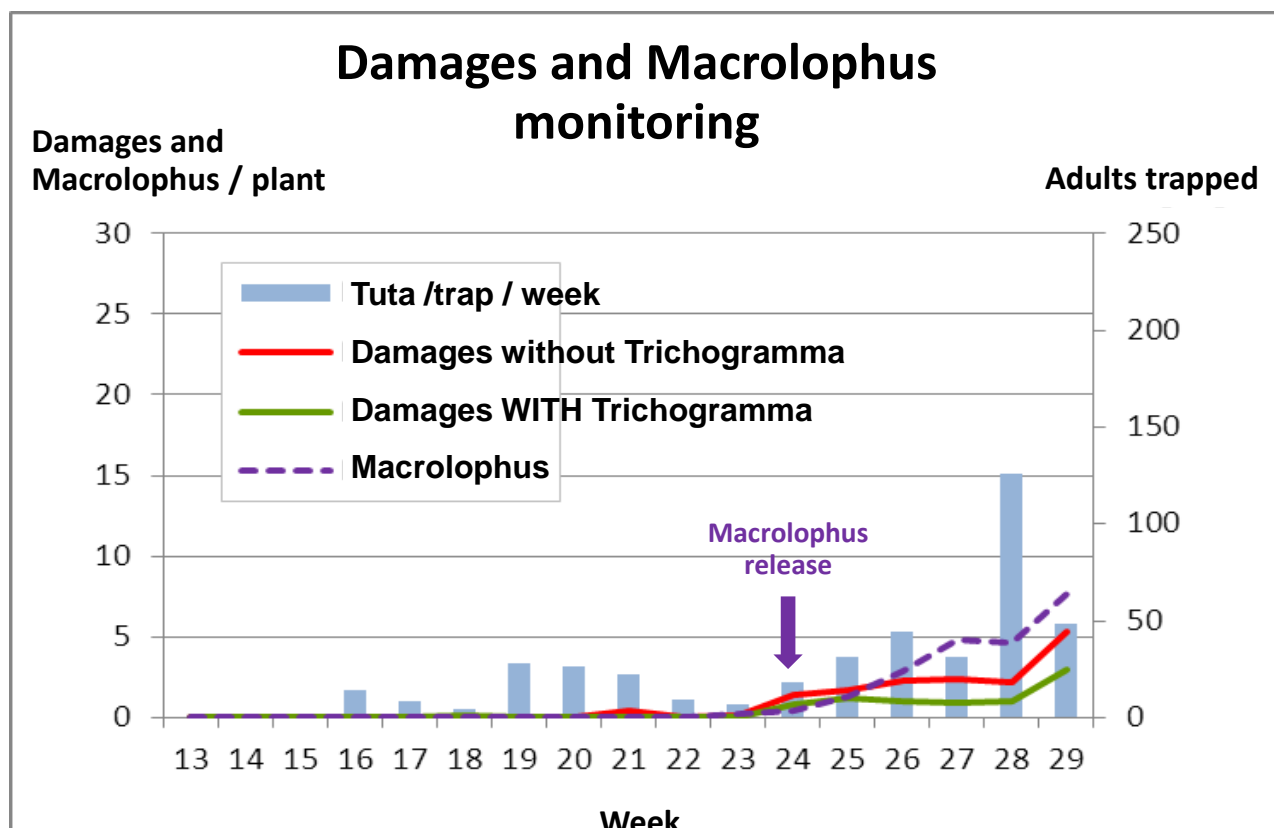


- ➔ Macrolophus alone are not sufficient to control *Tuta*
- ➔ Very good *Tuta* control with combinaison Trichogramma + Macrolophus



Site 3 (06) :

- Farm in organic farming
- Less trapping than sites 1 and 2 (medium pressure)
- Farmer practices / Tuta = Macrolophus
→ Very good Macrolophus installation



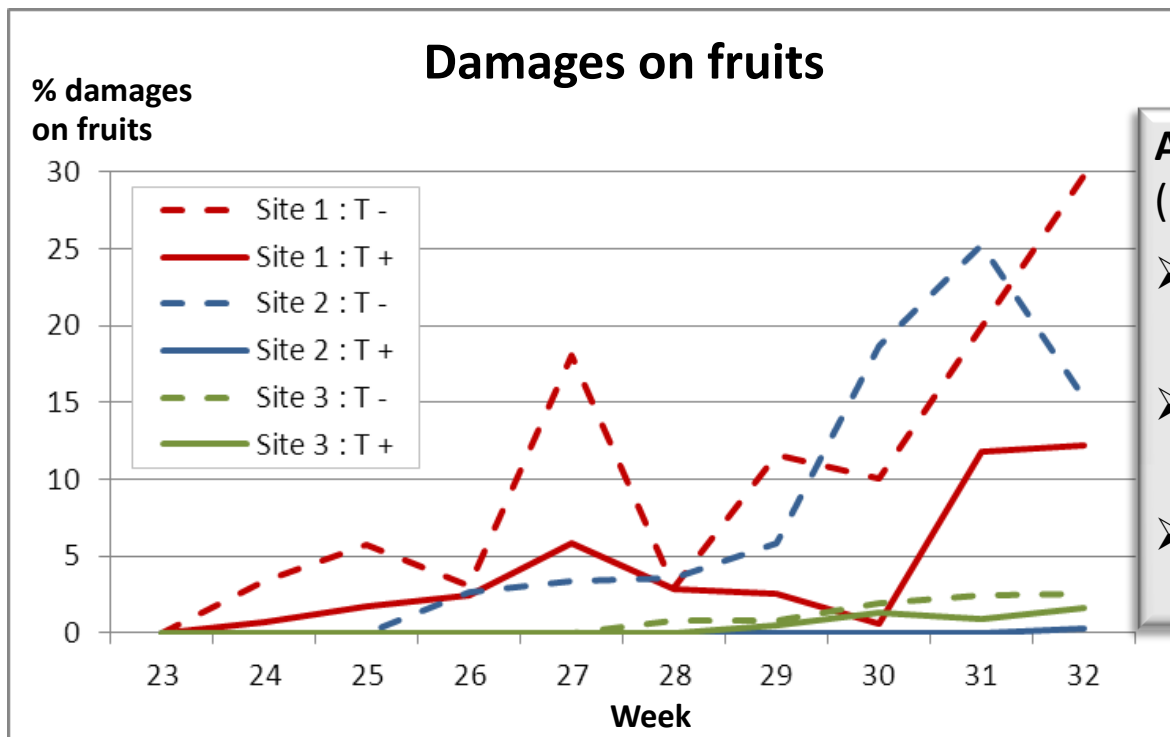
- ➔ Few damages on both plots
- ➔ In a situation of medium pressure, with good Macrolophus installation, Macrolophus provide adequate protection



Damages on fruits

3 sites :

- Fruit damage : Similar dynamic as on leaf damage
- **Site 1, with Tricho, without Macro** : twice less fruit damage
- **Site 2, with Tricho and Macro** : no damage on fruits
- **Site 3, with Macro ++** : similar damages on both plots, with and without Trichogramma



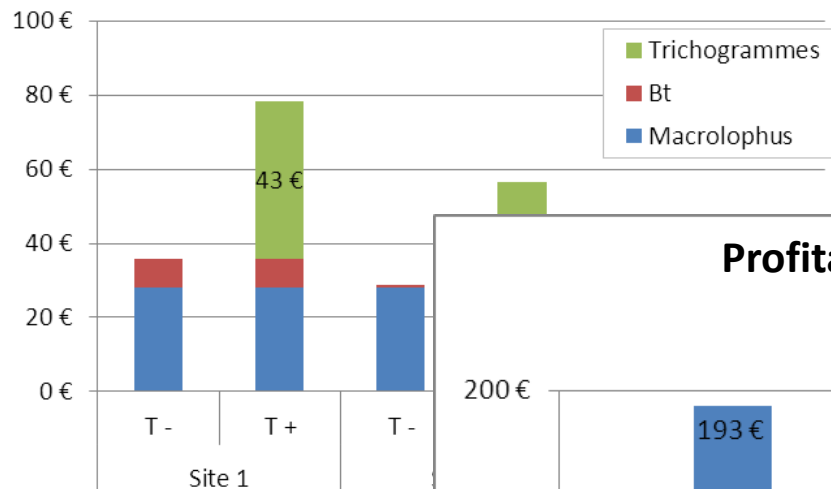
Additional production (plots with Trichogramma) :

- **Site 1 : + 128,4 kg/100m²
= 10,8% more**
- **Site 2 : +120,7 kg/100m²
= 15,5% more**
- **Site 3 : + 7,1 kg/100m²
= 0,9% more**

➔ Efficacy of Trichogramma releases
➔ Interest in Trichogramma + Macrolophus association

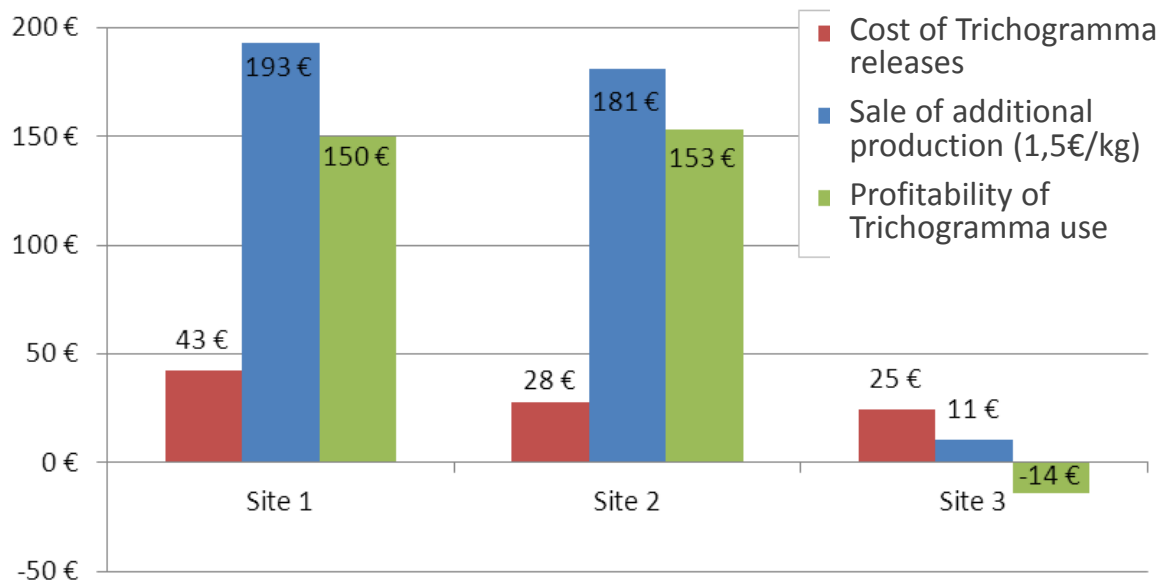
Profitability of Trichogramma use

Cost of Tuta control (€/100m²)



- Trichogramma : 25 à 45€/100m²
- Equivalent to 2 Macrolophus releases

Profitability of Trichogramma use (€/100m²)



- ➔ In situation of high pressure (Sites 1 and 2) = Profitability of Trichogramma use
- ➔ Possibility to modulate Trichogramma releases according to Tuta pressure and Macrolophus installation (importance of monitoring)

THANK YOU FOR YOUR ATTENTION!



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