



Previous Biobest Innovations

2012 Flying Doctors

SIVAL D'ARGENT



2015 Bernard Blum Award (ABIM)

2014 Nutrimite



Excellence in Soft Fruit IPM Award

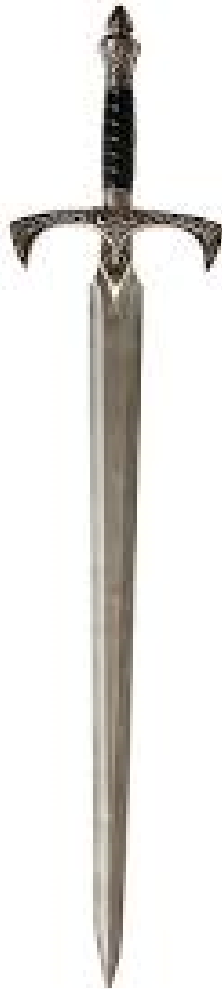


Turning Ants From Foes to Friends





Ants: A Double-Edged Sword





Ants in Agriculture: costs and benefits

Protecting plants by removing

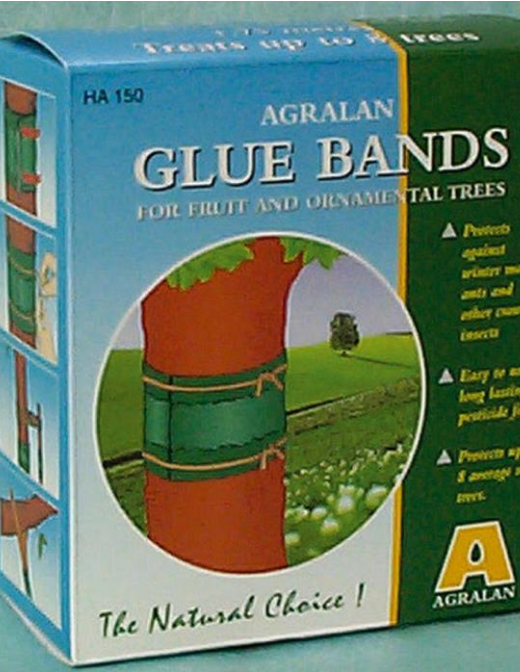
- plant feeders
- pathogens

Increasing plant damage by protecting
honeydew producing herbivores





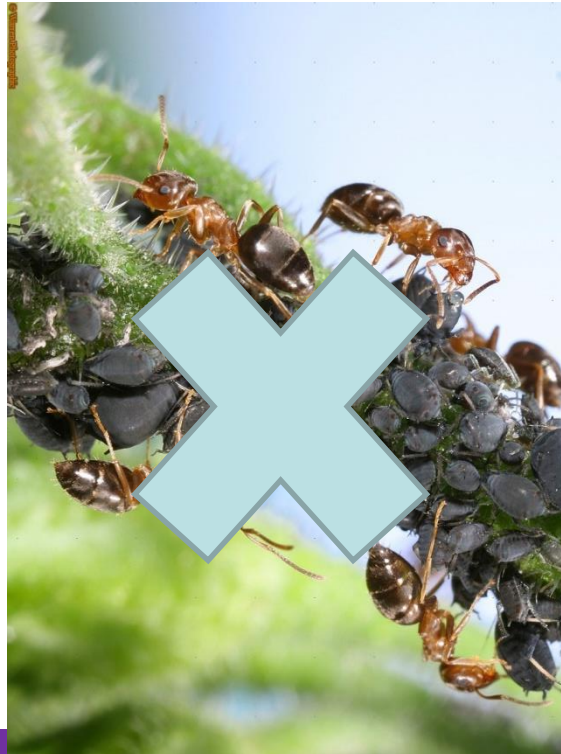
Ant control





Ant control

By eliminating ants...



**We also lose a powerful ally
in pest control**



**Let's not throw the baby out
with the bath water.**





An Alternative...

The Ant Diet





Ant Distraction?



Citrus orchard (*Citrus reticulata*, Valencia (Spain))

Ant: *Lasius grandis*

Pest: *Aphis spiraecola*

Treatments:

Sugars on the branches (X 5 trees)

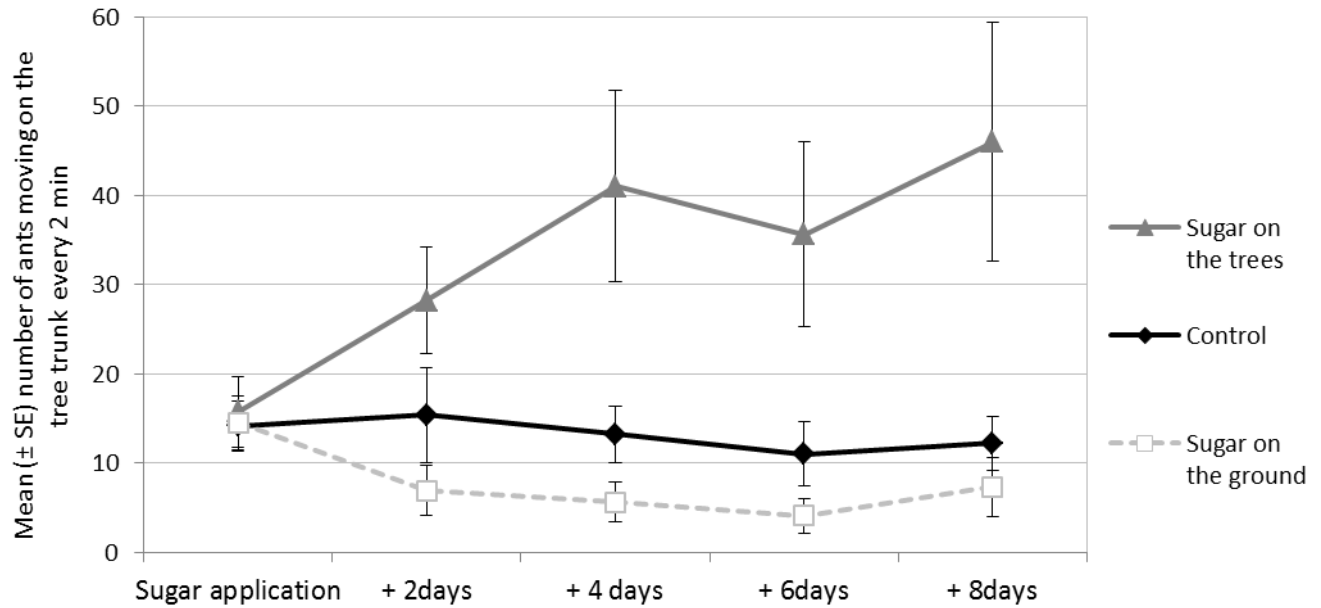
Sugars on the ground (X 5 trees)

Control (no sugars) (X 5 trees)



Effect of sugar supplements on ant activity

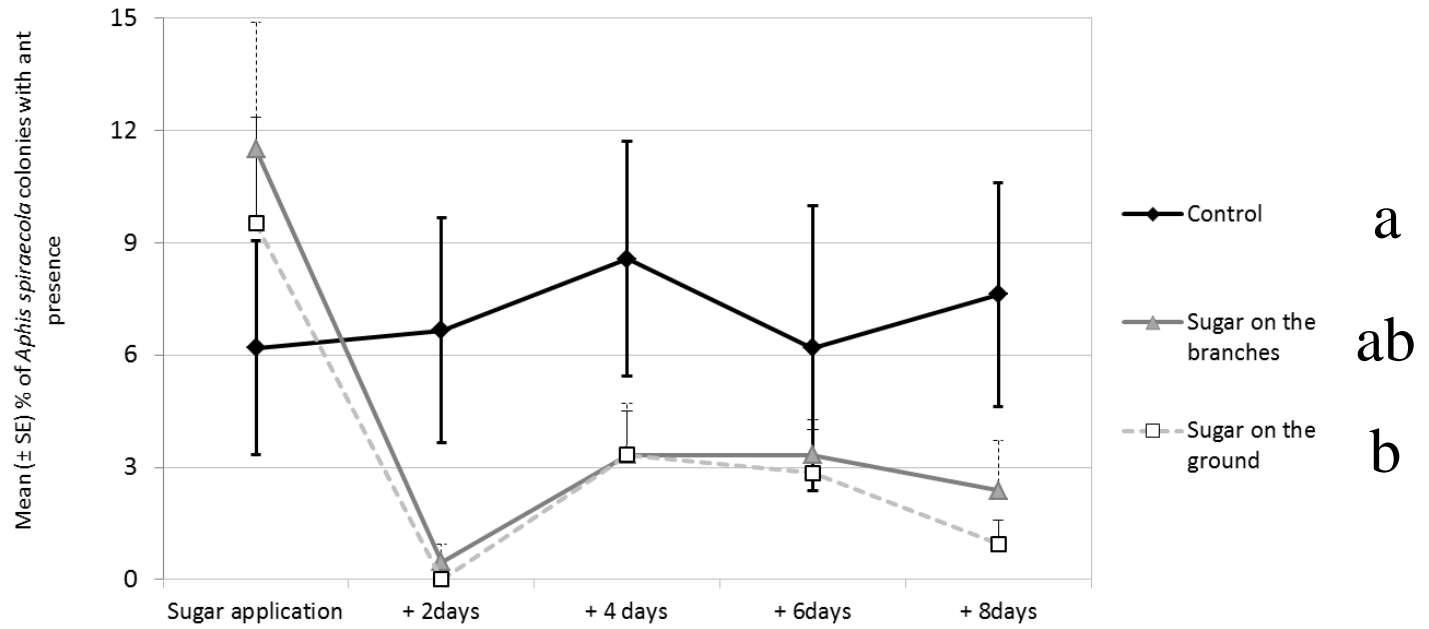
(number of ants ascending or descending the tree trunk during 2 min)



a
b
c



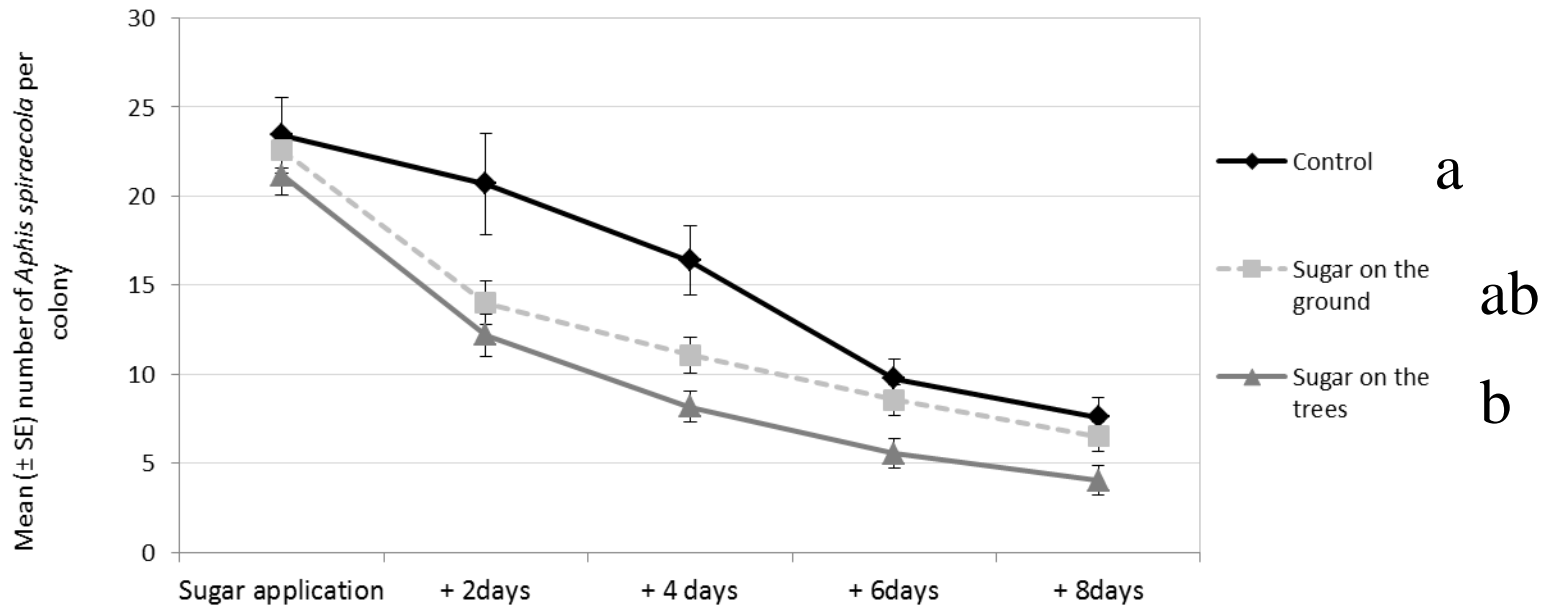
Effect of sugar supplements on ant-tending





Effect of sugar supplements on *Aphis spiraeicola* colony size

(Number of aphids per colony)





Effect on *Aphis spiraecola* natural enemies

Natural enemy	Sugars on the trees	Control (no sugars)
Coccinellidae*	41	16
Mummified aphids	16	8
Adult parasitoids	10	7
Diptera†	10	2
Neuroptera‡	3	0
Araneae*	2	6
Total	82 a	39 b

*Adults and juveniles

†Larvae of Syrphidae and Cecidomyiidae

‡ Larvae of Chrysopidae and Coniopterygidae

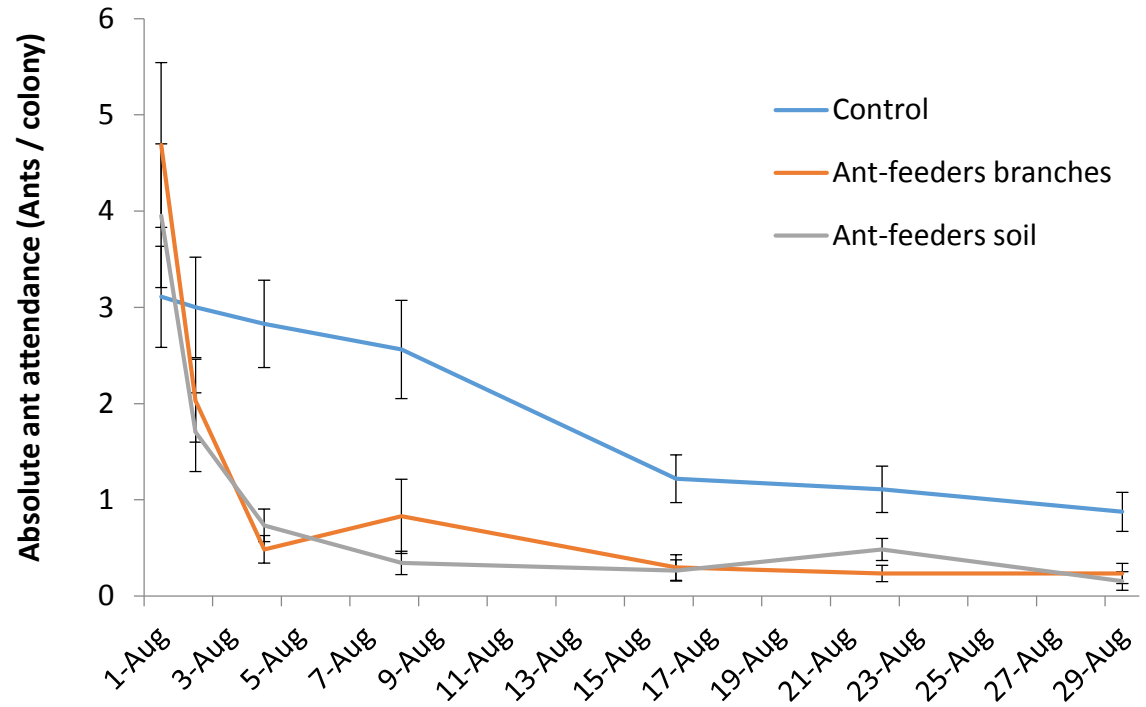




Mealybugs (*Planococcus citri*)

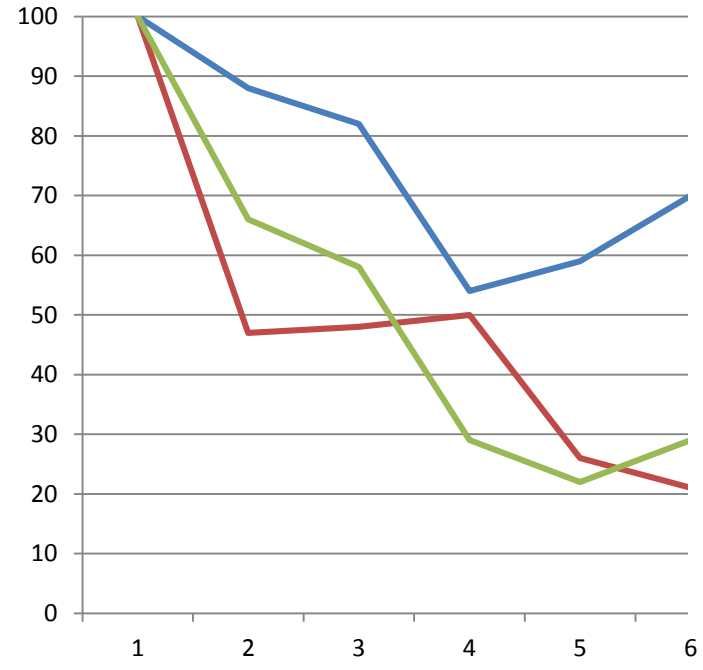


IVIA (Alejandro Tena) Ant Attendance





Size mealybug colonies (% of intial size)



- Control
- Feeder branches
- Feeder soil

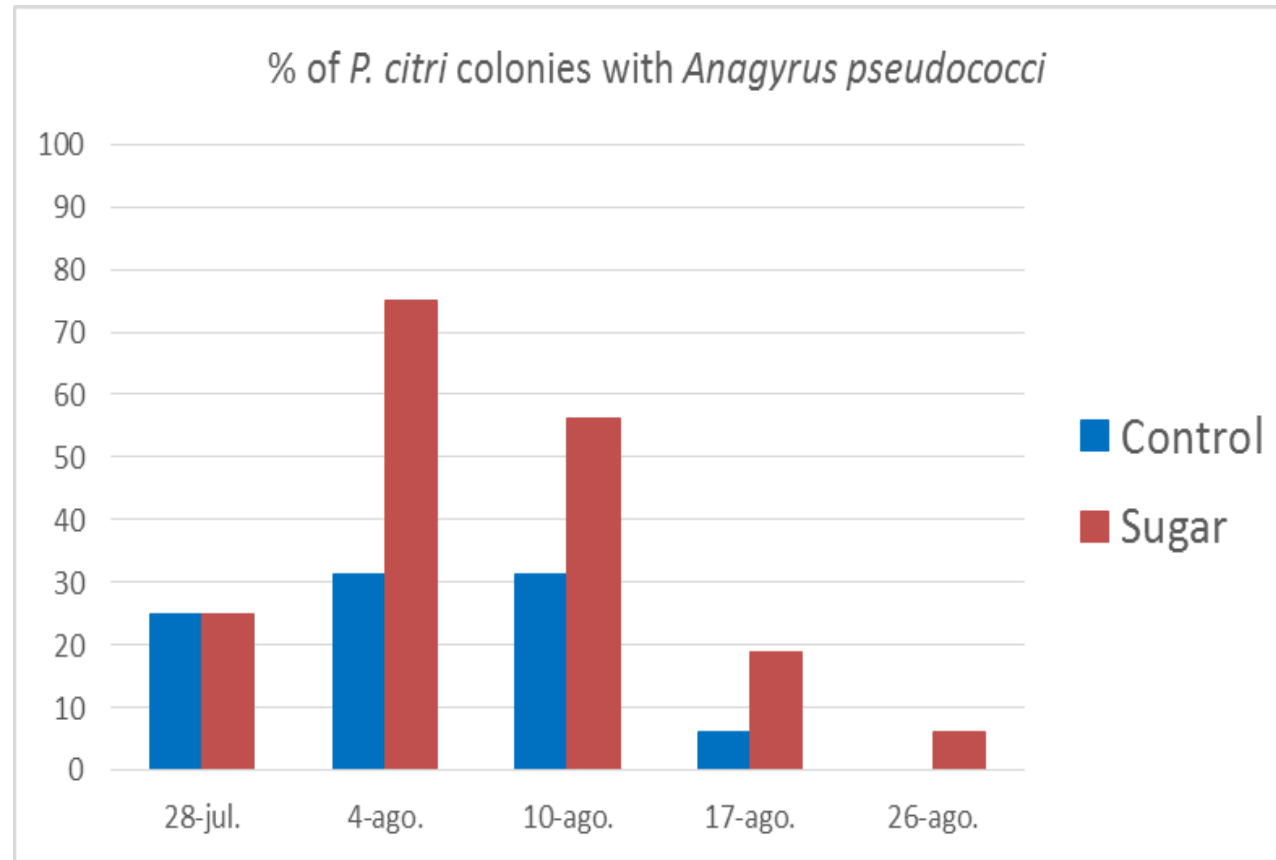


Enhanced parasitism by *Anagyrus pseudococci*



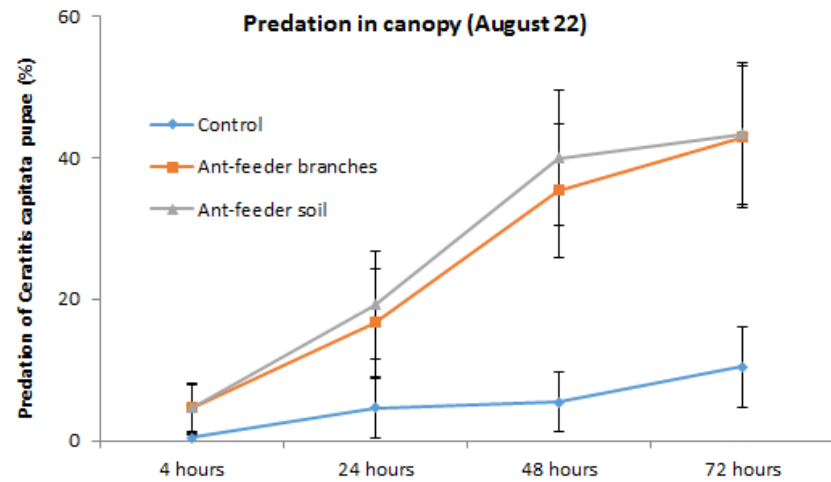


Enhanced parasitism by *Anagyrus pseudococci*





Ant Predation





Conclusions:

- Ant activity can be manipulated through use of alternative sugar sources: Ant activity is increased if the sugar is placed on the branches; decreased if placed on the ground.
- Ant-tending of aphid and mealybug colonies is significantly reduced when alternative sugar sources are provided
- The abundance of natural enemies is significantly enhanced when alternative sugar sources are provided
- Ant predation is strongly increased when sugar feeders are presented
- The size of the aphid colonies is significantly reduced when alternative sugar sources are provided



Attract and Distract

An effective innovation to distract ants from protecting pests while harnessing their important role as predators

