Measuring the impact of *Harmonia axyridis* intraguild predation on native coccinellids in the field

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H. axyridis impacts on non-targets arthropods

Aphids predators guild

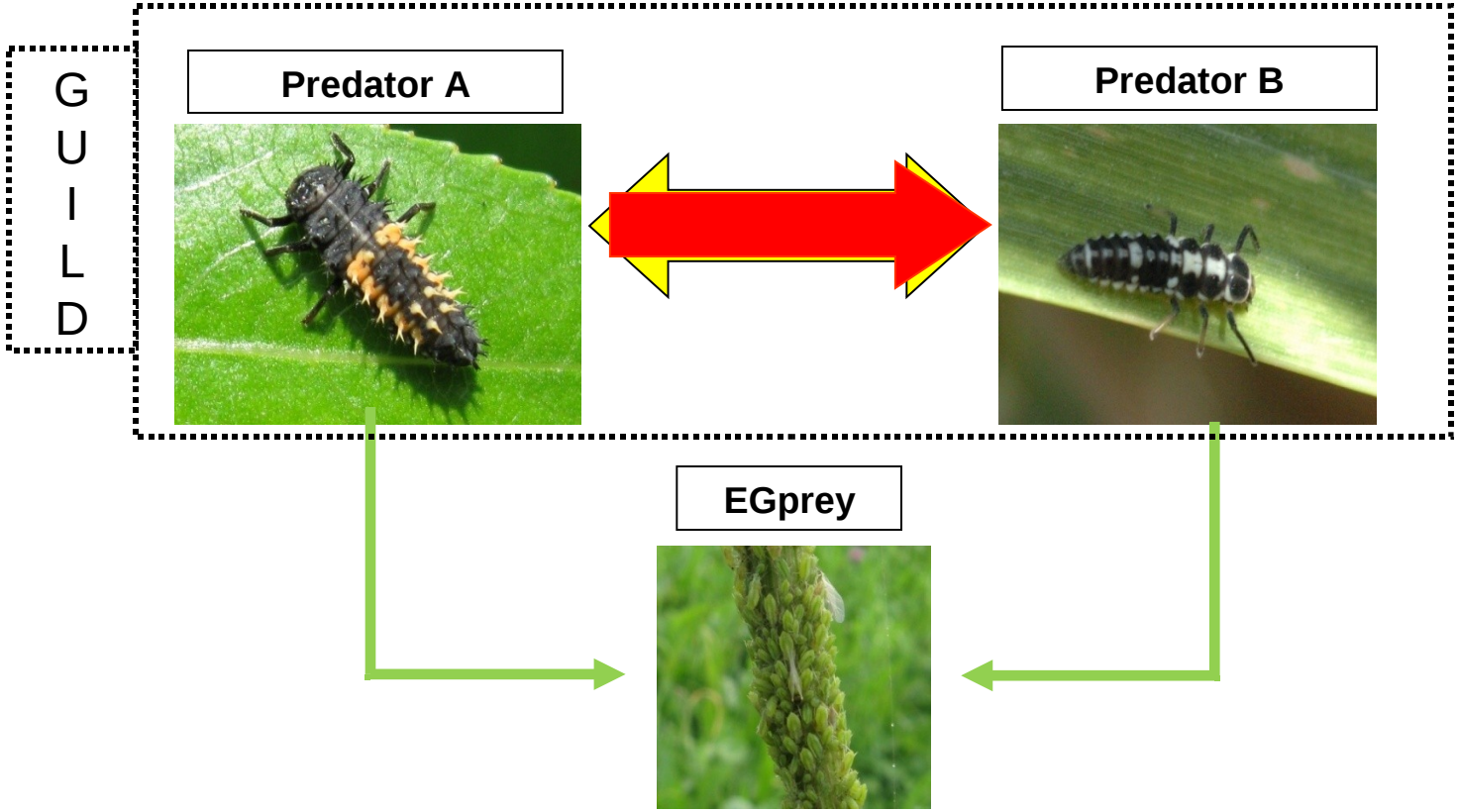
- Dominance : presence & abundance
- Decline of native species observed in USA and Europe
  => competition?
  => intraguild predation ?

Extraguild

- Chrysomelidae (Col.) (Sebolt & Landis, 2004)
- Danainae (Lep.) (Koch et al. 2006)

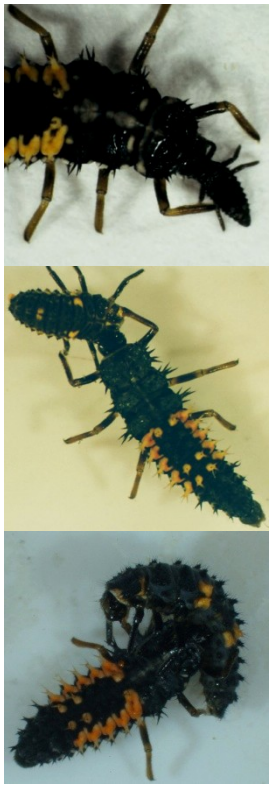
Intraguild predation (IGP)

« *Killing and eating of species that use similar resources* »



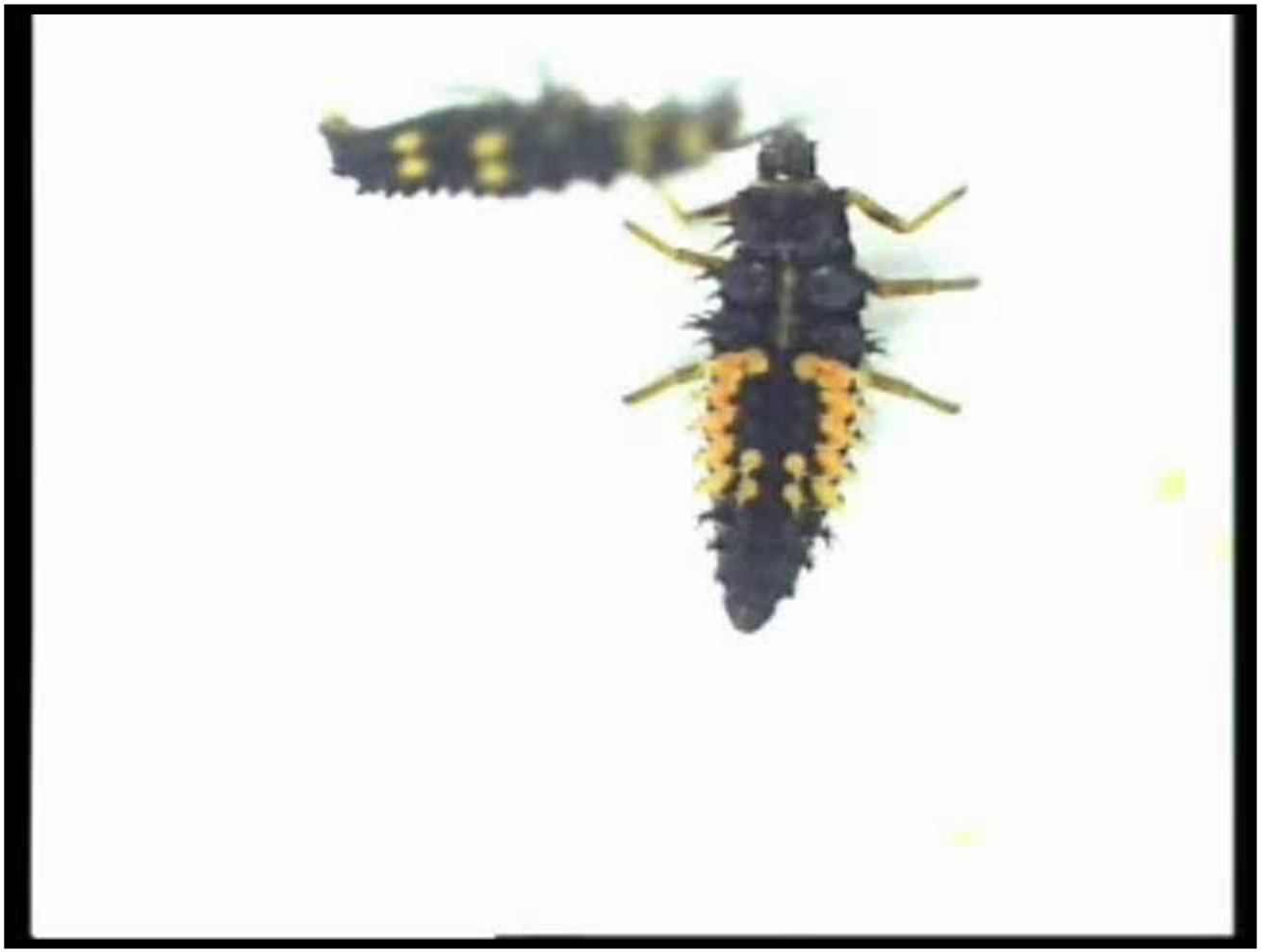
IGP by *H. axyridis* in laboratory

Species	IGprey	Instar	References
Dipt., Cecidomyiidae			
Aphidoletes aphidomyza	Y	L	Gardiner & Landis 2007
Col., Coccinellidae			
Adalia 2-punctata	Y	E, L1, L4, P	Burgio et al. 2002; Kajita et al. 2000; Ware & Majerus 2008
Adalia 10-punctata	y	L1, L4	Ware & Majerus 2008
Adonia variegata	Y	E	Lynch et al. 2001
Anatis ocelata	(N)	L1, L4	Ware & Majerus 2008
Calvia 14-guttata	Y	L1, L4	Ware & Majerus 2008
Cheilomenes 6-maculatus	Y	L1, L4	Ware & Majerus 2008
Coccinella 7-punctata	Y	L1, L4	Ware & Majerus 2008
Coccinella 7-punctata brucki	Y	L1,L2,L3 L4	Yasuda et al. 2001; Ware & Majerus 2008
Coccinella 11-punctata	Y	E, L2, L4	Nóia et al. 2008
Coccinella 15-punctata	Y	L1, L4	Ware & Majerus 2008
Coccinella transversoguttata	Y	L3	Snyder et al. 2004
Coleomegilla maculata	Y	E	Cotrell & Yeargan 1998
Cycloneda sanguinea	Y	E, L	Michaud 2002
Hippodamia convergens	Y	L3	Snyder et al. 2004
Eocaria muiri	Y	L1, L4	Ware & Majerus 2008
Propylea japonica	Y	L	Dixon 2000
Propylea 14-punctata	Y	E, L1, L4	Lynch et al. 2001; Ware & Majerus 2008
Hem., Pentatomidae			
Podisus maculiventris	N	L2, L3, L4, I	De Clercq et al. 2003
Neur., Chrysopidae			
Chrysoperla carnea	Y	E	Phoofolo & Obrycki, 1998



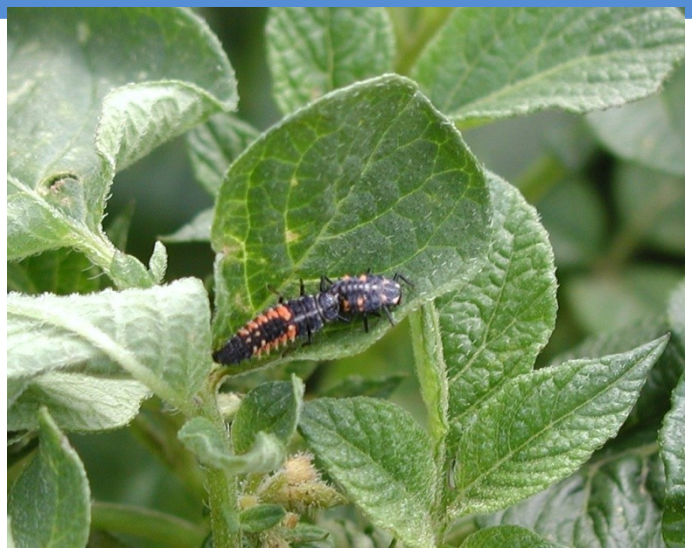
E: egg, L: Larva, P: Pupa, I : Imago

IGP by *H. axyridis* in laboratory



IGP by L4 *H. axyridis* on L4 *C. 7-punctata*

IGP by *H. axyridis* in the field



IGP in the field :
frequent
or
occasional ?

- Influence of EGprey, IGprey, niche overlap,...

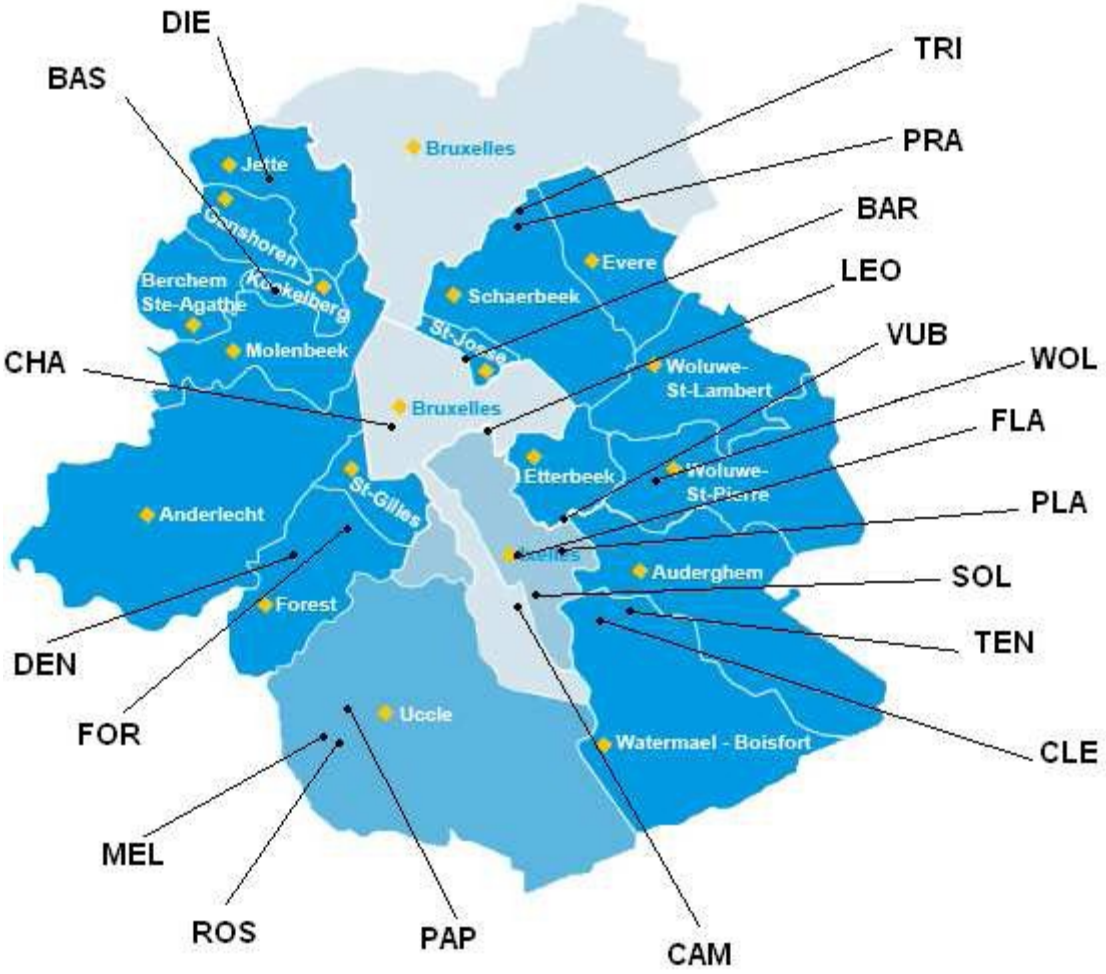
- To follow in the field the IGP by *H. axyridis* on coccinellids :

  New method of IGP detection : based on exogenous alkaloid detection in *H. axyridis* (Hautier *et al.*, 2008)

Hautier L, Grégoire JC, De Schauwers J, San Martin G, Callier P, Jansen JP, de Biseau JC. 2008. Intraguild predation by *Harmonia axyridis* on coccinellids revealed by exogenous alkaloid sequestration.

Field study in *Tilia spp* tree

20 sites in Brussels sampled in June - July 2008



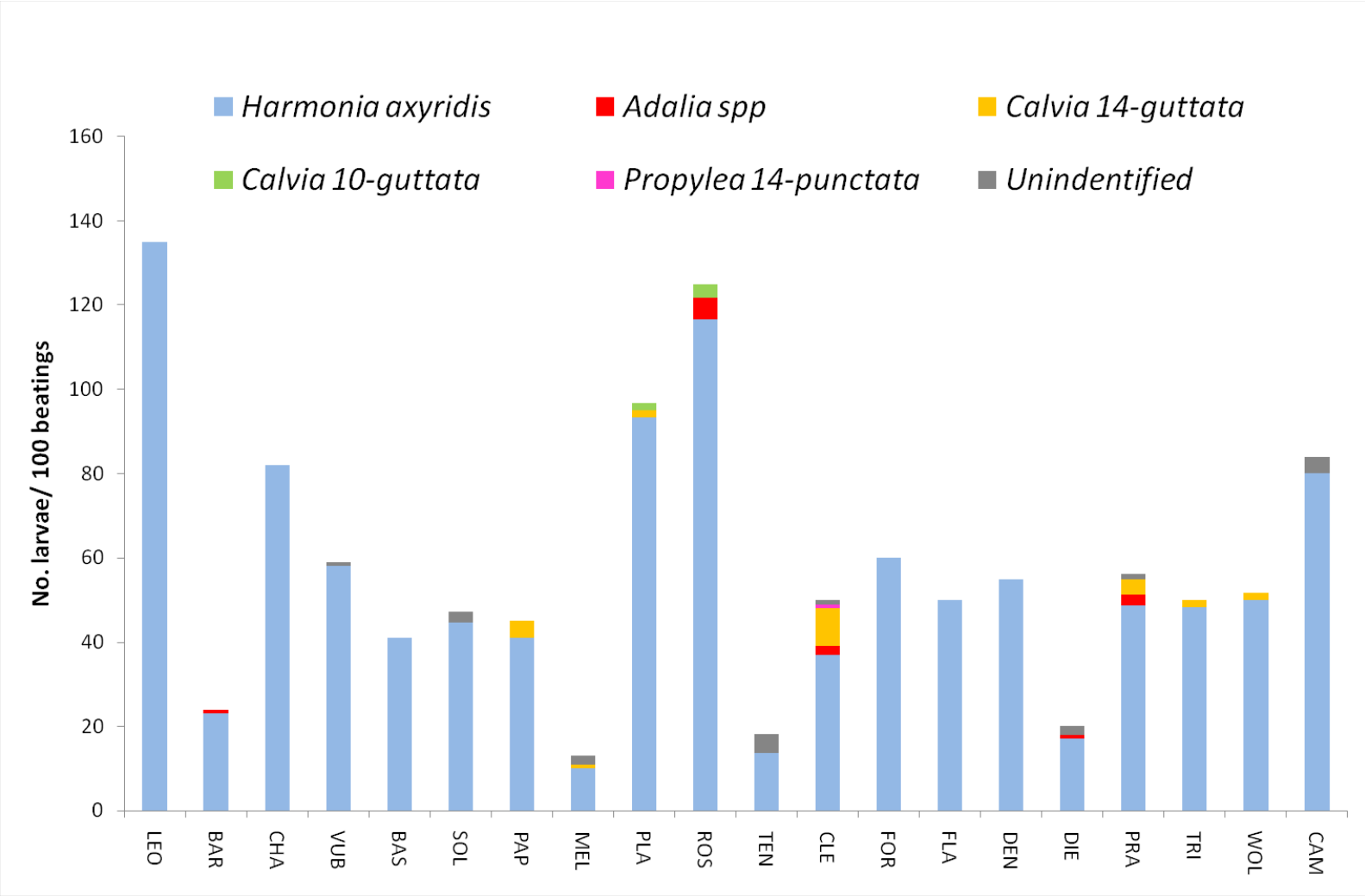
Field study in *Tilia spp* tree

- Coccinellids samplings
  - beating to collect a maximum number of larvae (40 – 110 branchs/site)
  - Species ID
  - Separation of *H. axyridis* larvae (L3-L4) in microtubes
  - Freezer at -20 °C
- Alkaloid extraction and detection by GC-

Coccinellids adults

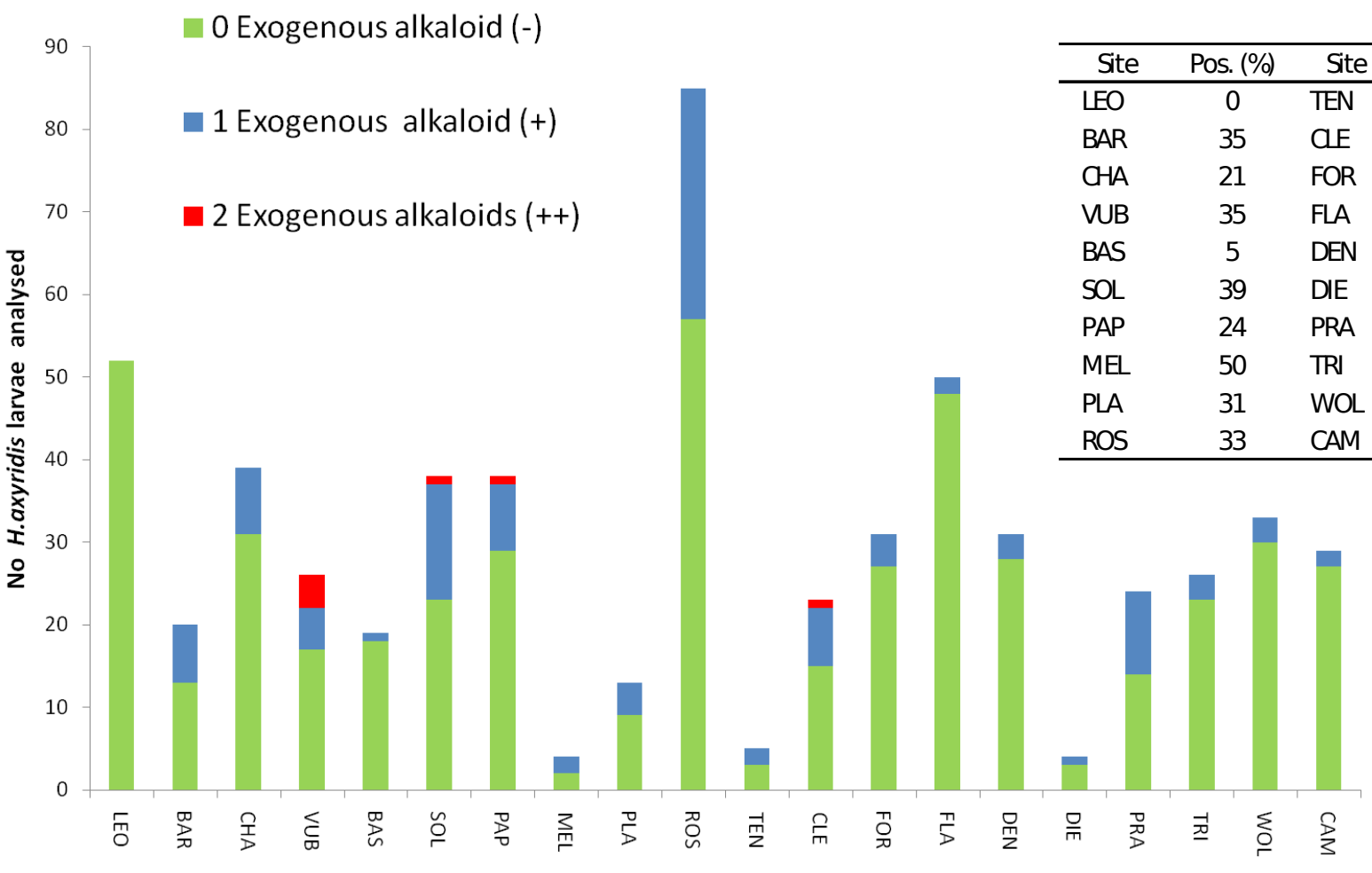
Coccinellids larvae

Coccinellids larvae



IGP by *H. axyridis*

No. *H. axyridis* larvae with and without exogenous alkaloids



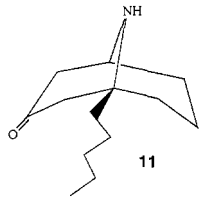
Site	Pos. (%)	Site	Pos. (%)
LEO	0	TEN	40
BAR	35	CLE	35
CHA	21	FOR	13
VUB	35	FLA	4
BAS	5	DEN	10
SOL	39	DIE	25
PAP	24	PRA	42
MEL	50	TRI	12
PLA	31	WOL	9
ROS	33	CAM	7

IGP by *H. axyridis*

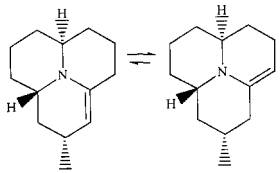
Which coccinellid species are attacked by *H. axyridis* ?

	Alkaloid	Species attacked
A	Adaline	*Adalia* spp.
B	Propyleine	*Propylea 14-punctata*
C	Calvine	*Calvia* spp.

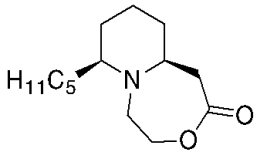
A



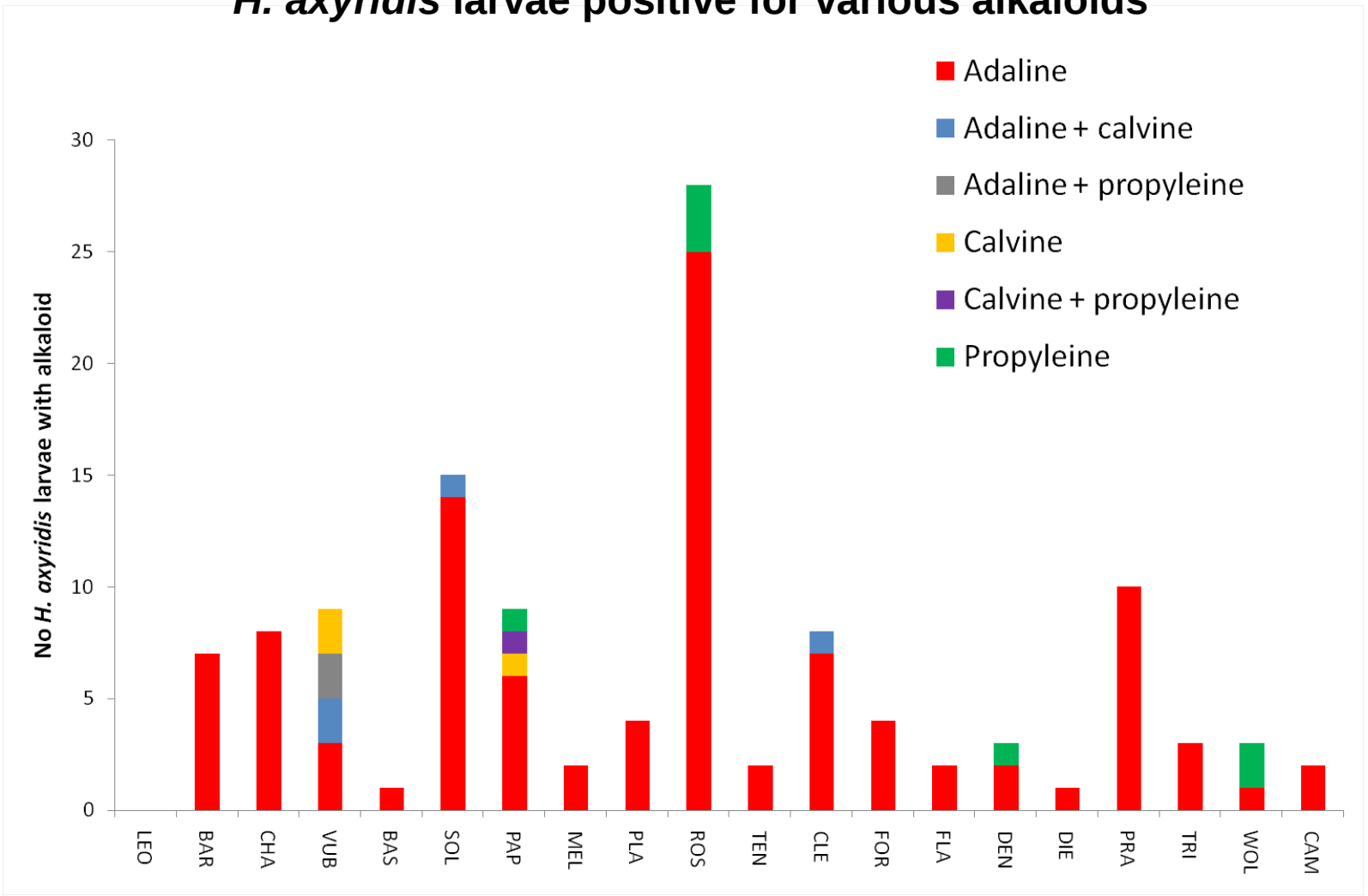
B



C



IGP by *H. axyridis*



Conclusions

- In lime trees, *H. axyridis* is the dominant coccinellid species, both in terms of presence in the sites and in abundance.
- Analysis of alkaloid content of *H. axyridis* larvae reveals the existence of IGP on native coccinellids and in 19/20 sites.
- IGP directed mainly towards *Adalia* spp. and might partly explain the

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