

Detection of intraguild predation by *Harmonia axyridis* on native coccinellids by alkaloids

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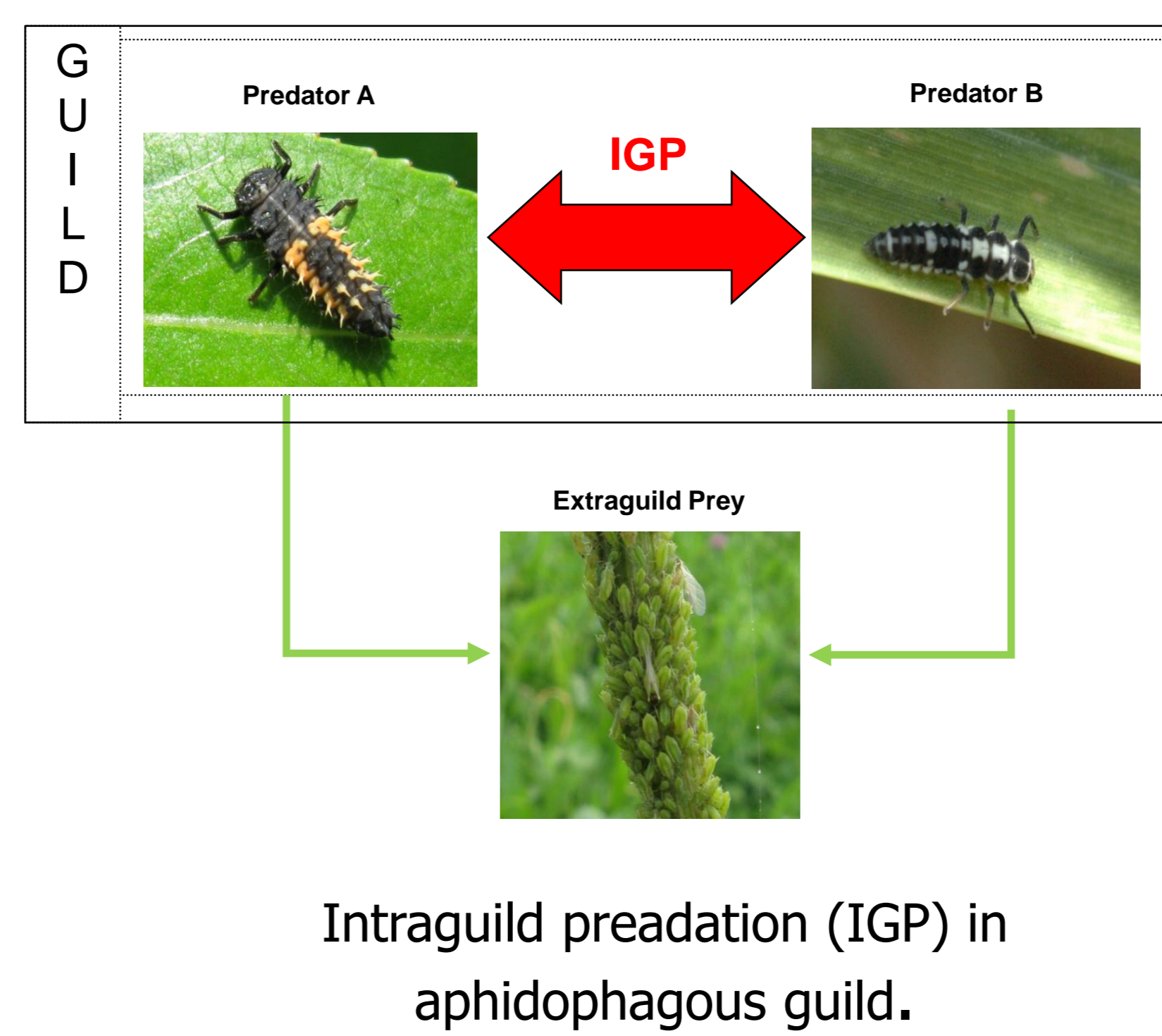
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Context

Intraguild predators (IGP), kill and feed upon species that use similar resources. In the laboratory, the invasive ladybird *Harmonia axyridis* Pallas is well known as an intraguild predator of ladybird species. However its real impact is poorly known in natural conditions where multiple prey species occur and have the opportunity to escape. As many ladybird species are chemically defended by alkaloids, these compounds could be used as predation tracers.

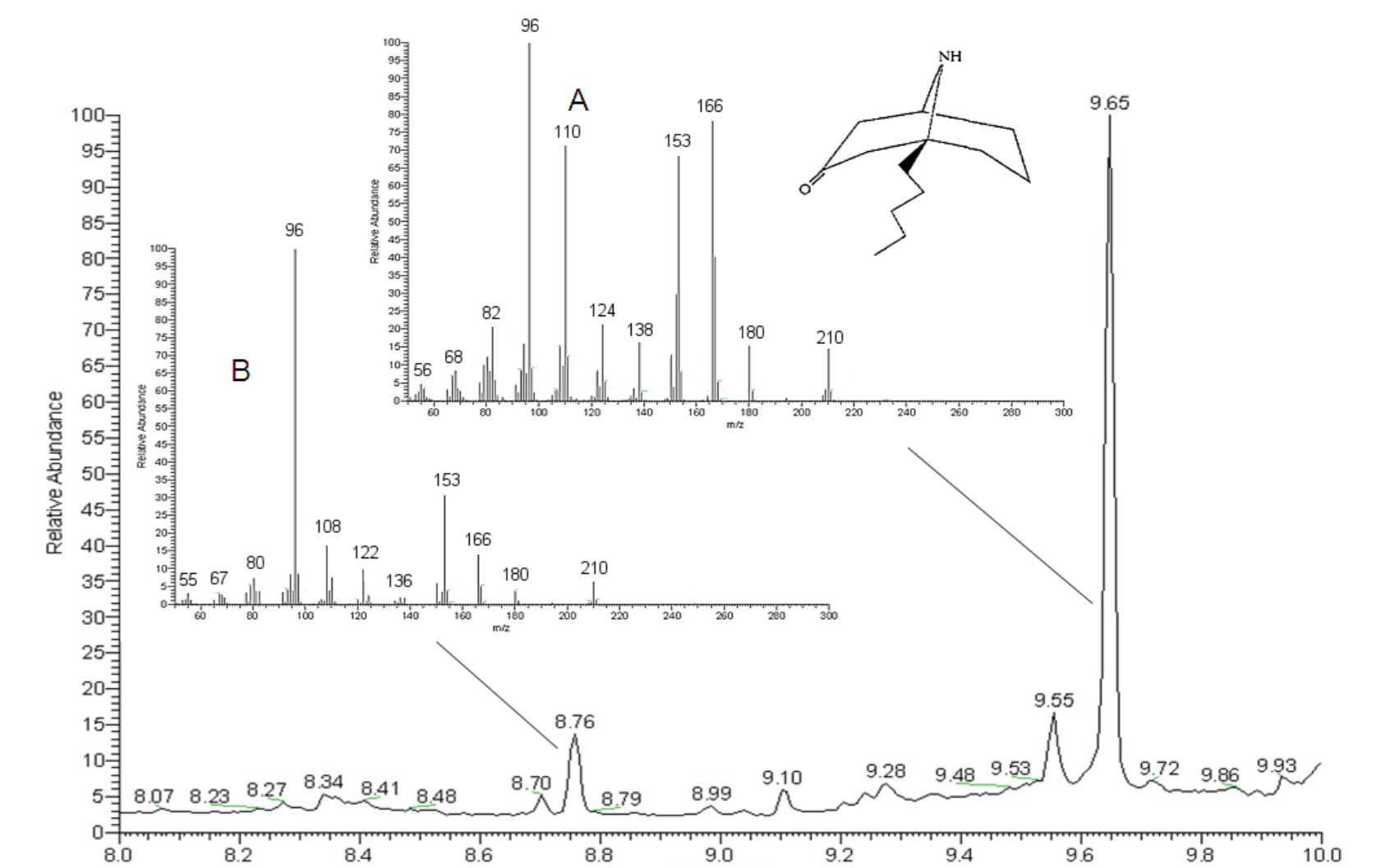
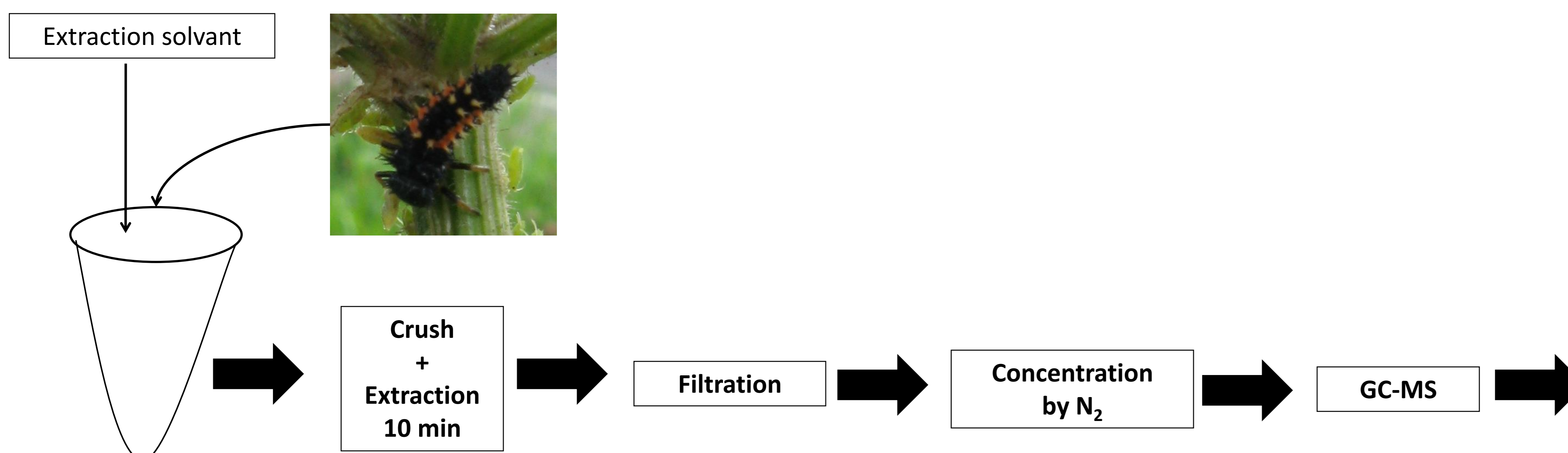
A new method based on alkaloid detection in *H. axyridis* larvae by Gas Chromatography - Mass Spectrometry was developed to monitor IGP by *H. axyridis* in natural conditions.

Next, this method was validated, using *H. axyridis* larvae sampled from potato fields and analysed by GC-MS.



IGP by *H. axyridis* on *Coccinella 7-punctata* in potato fields.

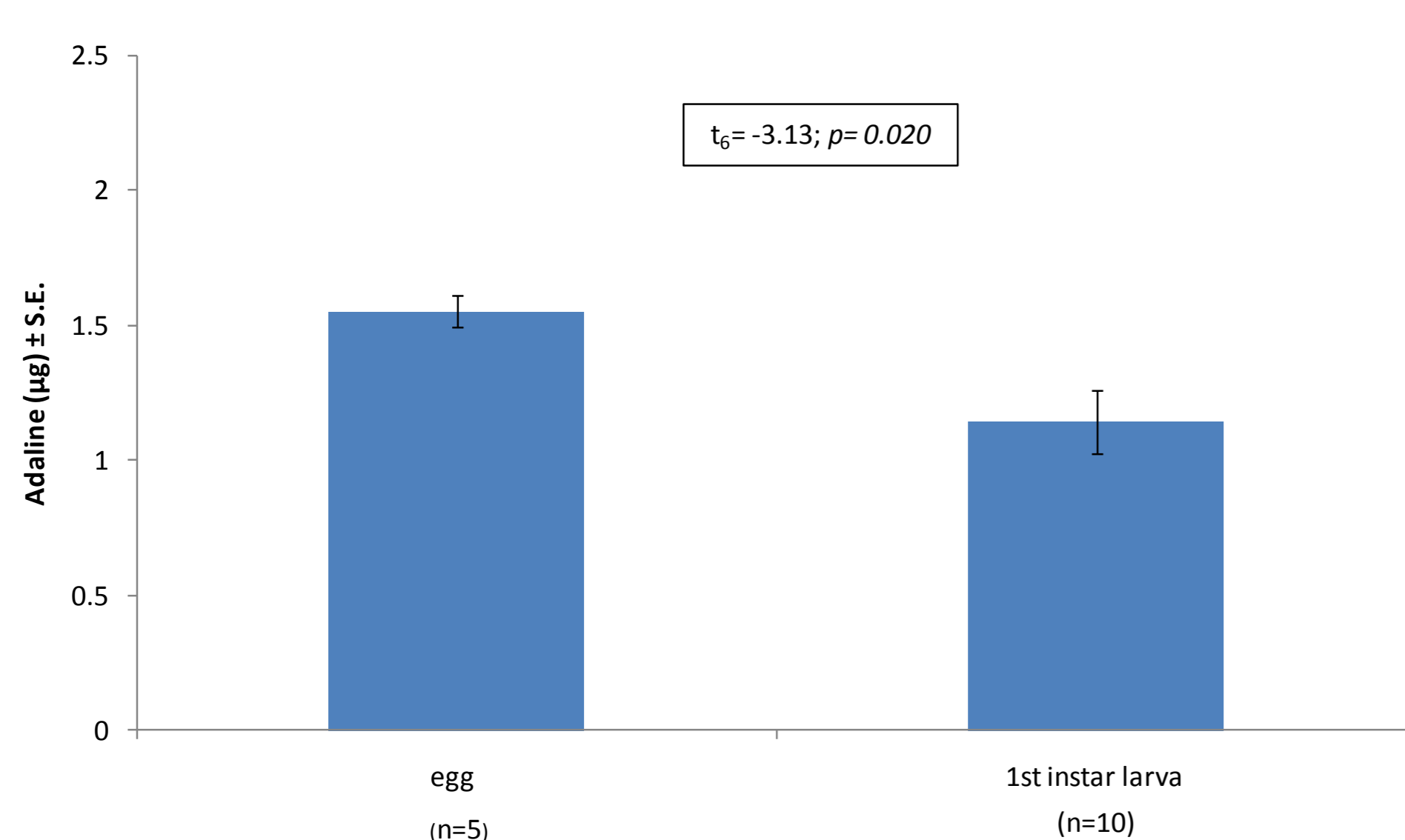
Alkaloid detection



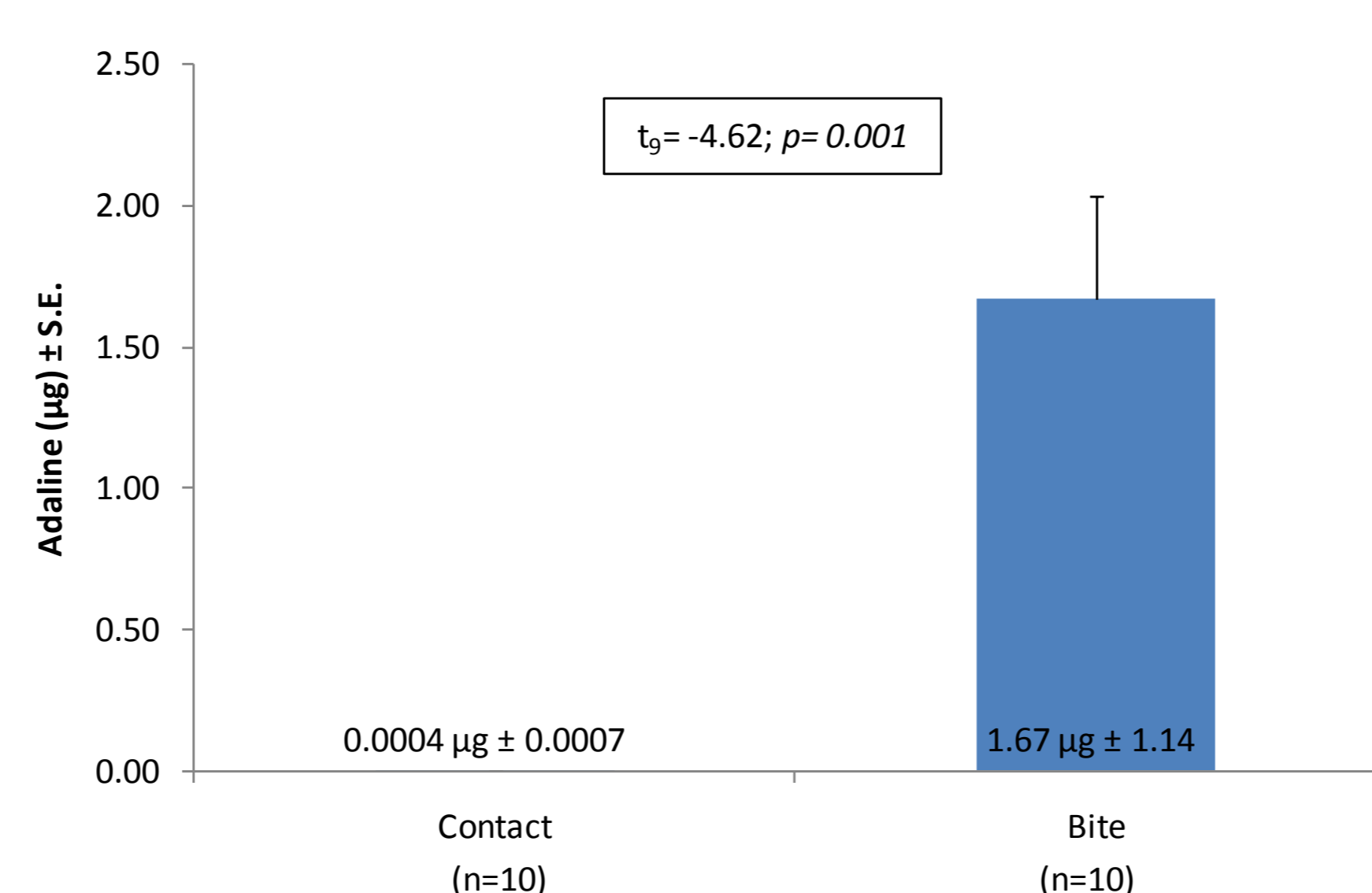
Mass spectra of adaline (A) and degraded adaline (B) from an extract of *H. axyridis* (L4) after ingestion of one *A. bipunctata* 1st instar larva

Laboratory results

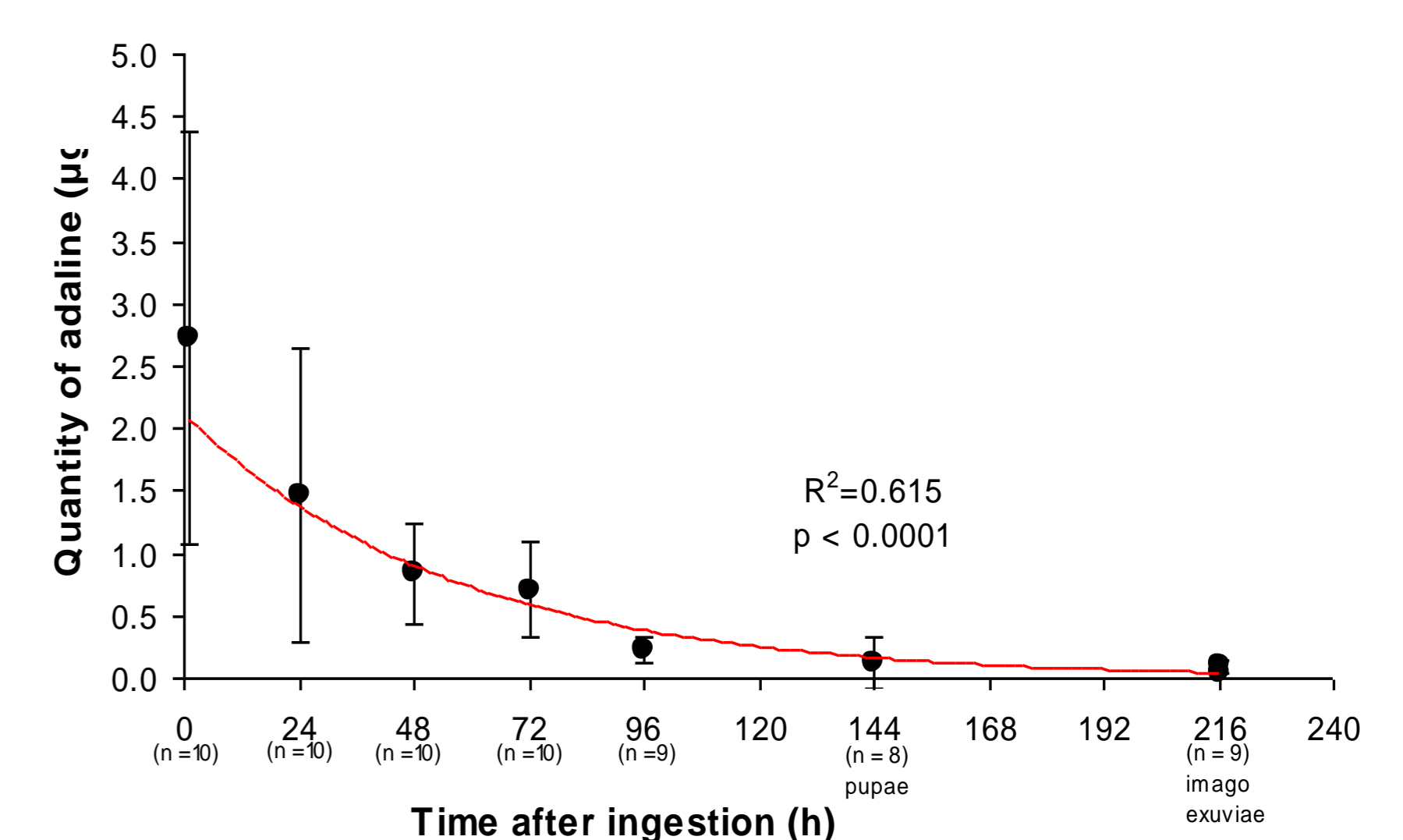
1) Influence of prey :
One egg vs.
one 1st instar *A. 2-punctata* larva



2) False positive :
Contacts with vs. bites on *A. 2-punctata*

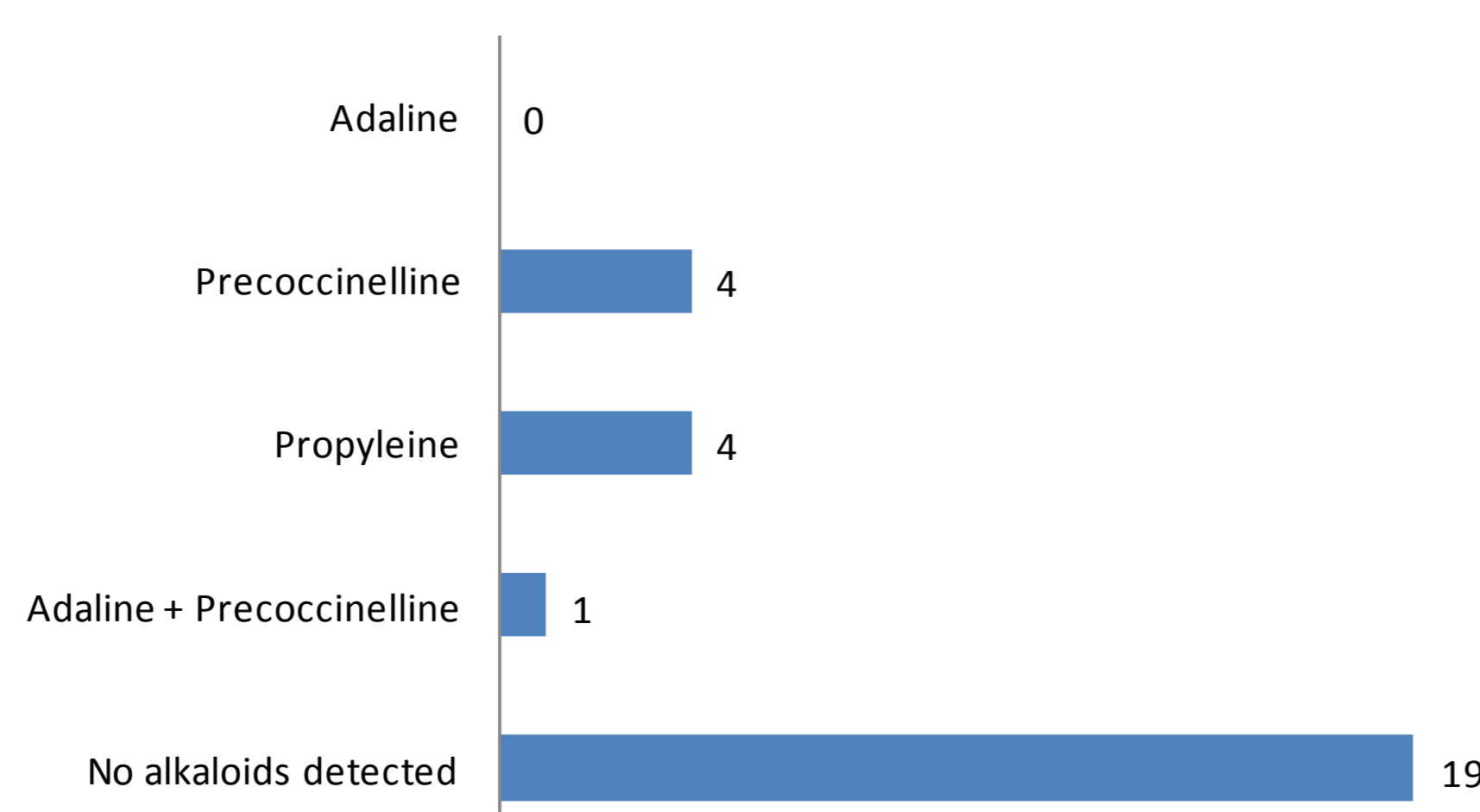


3) Change of adaline concentration in the predator with the time
One *A. 2-punctata* L₁ consumed by one *H. axyridis* L₁



Field results

Analysis of 28 *H. axyridis* larvae from potato fields sampled in 2005.



Conclusions

- The smallest quantity of prey alkaloid, corresponding to one 1st larva instar, can be detected in 4th instar *H. axyridis* larvae;
- The risk of false positives (to detect a contact instead of a bite) is very limited;
- Exogenous alkaloids, allowing to detect an IGP event, are still present in *H. axyridis* after several days.
- Field results in potato fields point out *H. axyridis* IGP on native coccinellids : *Adalia 2-punctata*, *Coccinella 7-punctata*, *Propylea 14-punctata*.
- Alkaloids can thus be used as a predation tracer to follow IGP between *H. axyridis* and native coccinellids in field conditions.