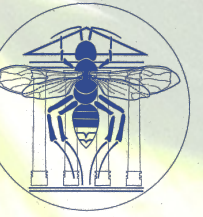


# Abundance and phenological model of *Harmonia axyridis* Pallas (Coleoptera: Coccinellidae) in field crops



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## Introduction



The **Multicolored Asian ladybeetle**, *Harmonia axyridis* (Pallas) (Coleoptera: Coccinellidae), was introduced into Western Europe in the late 1990s. This exotic and **invasive** species is known to thrive principally in shrubs and arboreal habitats. It is known to control aphids' populations and it is also a **voracious predator** of native aphidophages. We focus our work on *H. axyridis* **annual abundance** in various field crops and on its **phenological model**. An aphidophagous sampling was performed from 2009 to 2011 in four agrosystems: broad bean, wheat, corn and potato.



## Material and Methods

- Sampling from 2009 to 2011
- Observation period: March to September
- Crops: wheat, broad bean, corn and potato
- Sampling method: visual observations with quadrats of 1m<sup>2</sup> on transect (48 quadrats per crop and per week)
- Determination and counting of aphidophagous species (eggs, larvae, adults) and aphid species

## Results

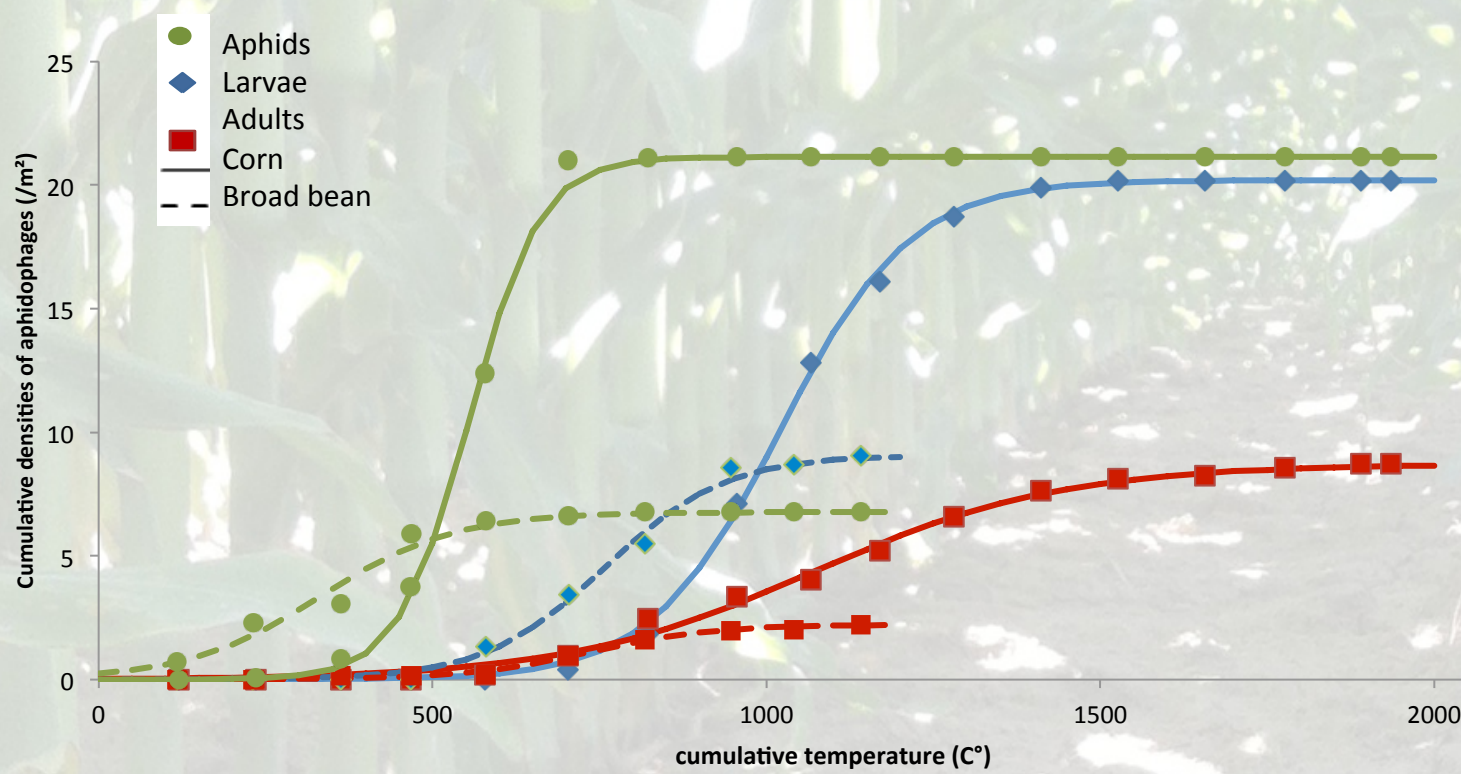


Fig1: Relationship between temperature (°C) and cumulated population of larval and adult stages of *H. axyridis* and aphids in broad bean and corn.

	Larvae	
	Gompertz	Logistic
Broad bean	$y = 9.08e^{-e^{-\frac{(x-693.77)}{132.72}}}}$ RSS: 1.39	$y = \frac{9.08}{1 + e^{-\frac{(x-758.47)}{90.51}}}}$ RSS: 0.76
Corn	$y = 20.20e^{-e^{-\frac{(x-957.19)}{138.23}}}}$ RSS: 0.83	$y = \frac{20.20}{1 + e^{-\frac{(x-1020.98)}{97.07}}}}$ RSS: 0.93
	Adult	
	Gompertz	Logistic
Broad bean	$y = 2.23e^{-e^{-\frac{(x-679.16)}{128.38}}}}$ RSS: 0.05	$y = \frac{2.23}{1 + e^{-\frac{(x-736.44)}{93.42}}}}$ RSS: 0.06
Corn	$y = 8.71e^{-e^{-\frac{(x-938.03)}{274.95}}}}$ RSS: 1.46	$y = \frac{8.71}{1 + e^{-\frac{(x-1069.60)}{187.40}}}}$ RSS: 1.06

Fig2: Phenological Logistic model of *H. axyridis* (adults and larvae) in corn and broad bean.

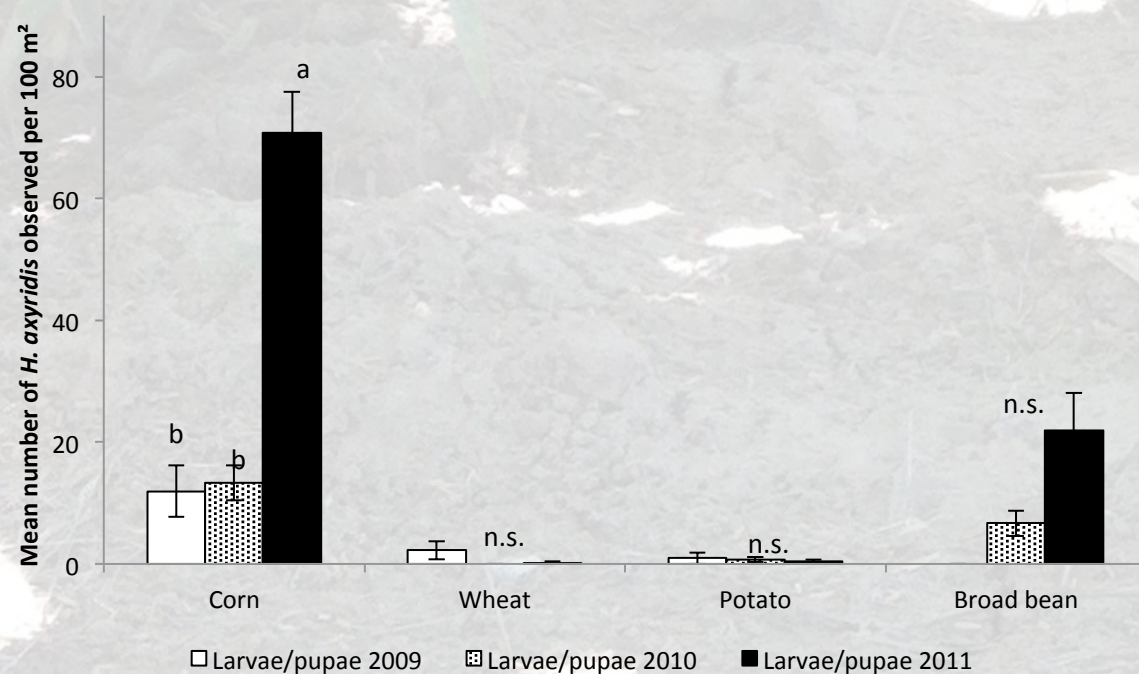


Fig3: Mean number (±SE) of *H. axyridis* larvae observed in corn, wheat, potato and broad bean from 2009 to 2011.

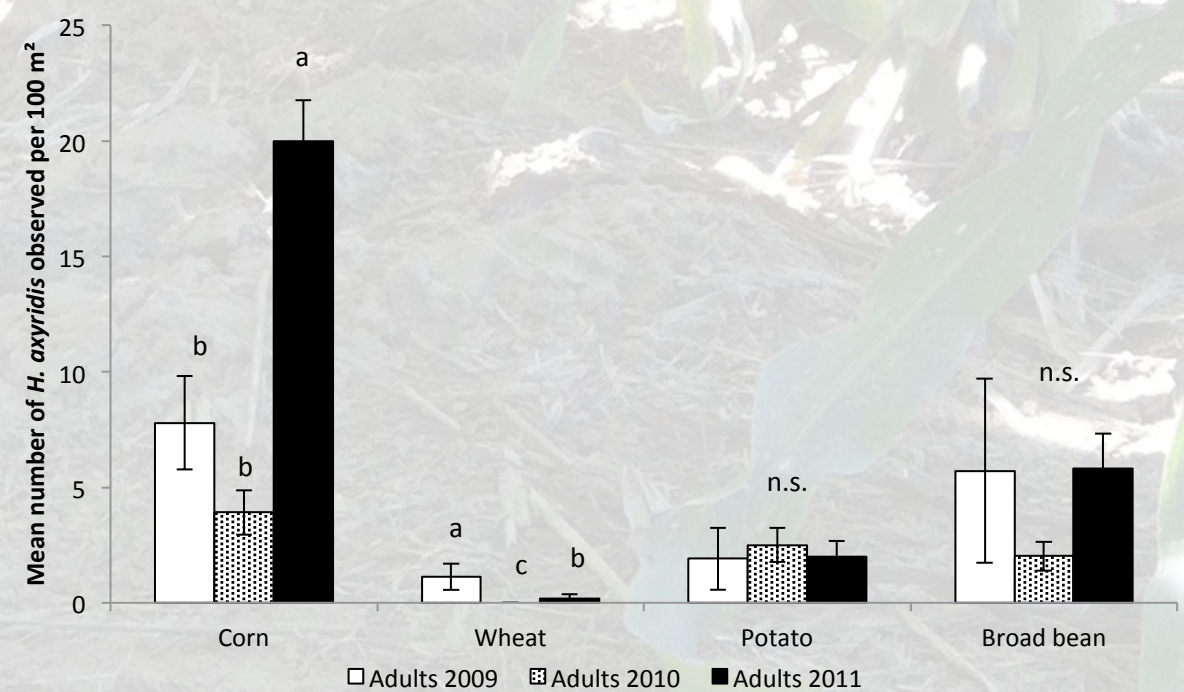


Fig4: Mean number (±SE) of *H. axyridis* adults observed in corn, wheat, potato and broad bean from 2009 to 2011.

## Conclusion

*Harmonia axyridis* densities in these four field crops showed that (1) *H. axyridis* is able to complete its development cycle in corn and in broad bean; (2) larvae and adults densities raised significantly (more than 3 times) from 2009 to 2011 in corn. The population dynamics of aphids and *H. axyridis* were characterized by a symmetric logistic function (S-shape) based on the cumulative population size. Temperature could be an other factor which impact on *H. axyridis* abundance. The logistic curves showed a sigmoid shape with an inflection point earlier in broad bean than in corn for aphids, larvae and adults of *H. axyridis*.

This study appears to strengthen the hypothesis that *H. axyridis* is also an invasive species of field crops.