



# Three Ninjas: paths to become the best

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## Potential of nabid predators for biocontrol

Damsel bugs are predatory bugs in the genus Nabidae (Hemiptera). We nicknamed them Ninja bugs, due to their characteristic hiding behaviour and hunting strategy.

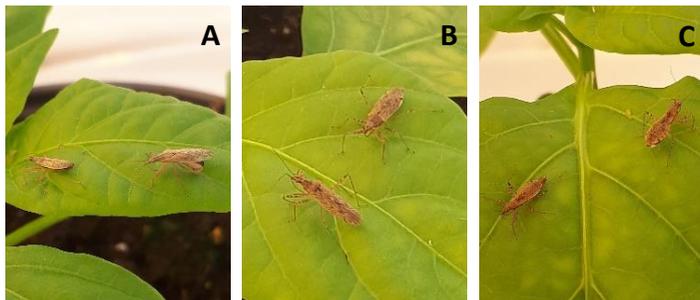
This genus is thought to be strictly zoophagous and prefers trichome-dense plants as their hunting ground.

Nabids are known as important predators in various field crops, feeding on aphids, thrips, spider mites, psyllids, moths and tarnished plant bugs.

We collected and evaluated three nabid species (Fig. 1) :

- *Nabis americanoferus* (most abundant species)
- *Nabis roseipennis* (active flying species)
- *Hoplistoscelis pallescens* (wingless species)

Predation efficacy and life history trials were carried out in the laboratory to select the best of the three Ninja species as a new biocontrol agent.



**Figure 1.** Three Ninjas: A) *Nabis americanoferus* adult, B) *Nabis roseipennis* adult, C) *Hoplistoscelis pallescens* adult.

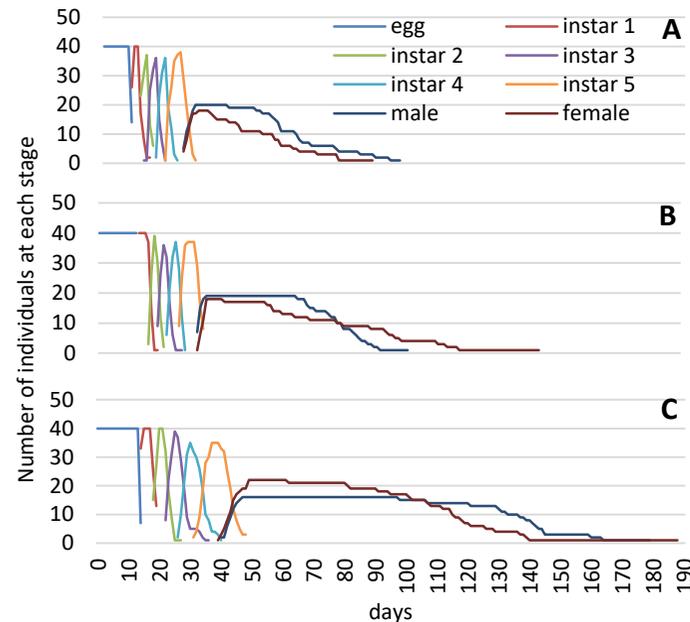
**Table 1.** Mean number  $\pm$  SE of common pest species killed/consumed in 24 hours when confined with one adult heteropteran predator. Three Ninja species were compared to a comparable, commercially-available species, *D. hesperus*. Within columns, different letters indicate significant differences.

	Green peach aphids adults (max 75)	Western flower thrips 2 <sup>nd</sup> instar (max 40)	Western flower thrips adults (max 40)	Two-spotted spider mites (max 35)	Greenhouse whiteflies 2 <sup>nd</sup> instar (max 30)	Greenhouse whiteflies adults (max 40)
<i>N. americanoferus</i>	40.4 $\pm$ 2.8 b	27.5 $\pm$ 1.4 a	18.9 $\pm$ 1.3 a	7.0 $\pm$ 1.3 c	9.5 $\pm$ 1.1 c	26.7 $\pm$ 1.7 a
<i>N. roseipennis</i>	44.7 $\pm$ 3.5 a	25.1 $\pm$ 1.6 b	11.5 $\pm$ 1.2 b	9.0 $\pm$ 1.5 c	12.3 $\pm$ 1.3 b	25.0 $\pm$ 1.5 a
<i>H. pallescens</i>	32.9 $\pm$ 3.4 c	22.7 $\pm$ 2.0 b	10.9 $\pm$ 1.2 b	12.2 $\pm$ 1.5 b	13.8 $\pm$ 1.2 b	24.6 $\pm$ 1.5 a
<i>D. hesperus</i>	10.2 $\pm$ 1.3 d	24.1 $\pm$ 1.6 b	6.3 $\pm$ 0.8 c	20.2 $\pm$ 1.8 a	18.5 $\pm$ 1.0 a	16.7 $\pm$ 1.2 b

## Predation efficacy

The predation rates of the three Ninjas were assessed on aphids, thrips spider mites and whiteflies and compared to the commercially-available mirid predator *Dicyphus hesperus* (Table 1):

- Females killed and consumed more prey than males across all three Ninja species.
- All three Ninja species showed similar predation efficacy and were significantly better than *D. hesperus* except for two-spotted spider mites and greenhouse whitefly nymphs.



**Figure 2.** Age-specific survival curve for three Ninjas. A) *Nabis americanoferus*, B) *Nabis roseipennis*, C) *Hoplistoscelis pallescens*.

## Life history

Development time, fecundity and longevity of the three Ninjas were determined when fed *Ephesthia kuehniella* eggs (Fig. 2):

- *N. americanoferus* took shortest time to develop.
- Generation time from egg hatching to maturing and laying the first egg was 35 days for *N. americanoferus*, 46 days for *N. roseipennis* and 56 days for *H. pallescens*.
- Life time fecundity was not significantly different among the species.

## Best Ninja

- Based on these trials, *N. americanoferus* has been selected as the **chosen one**.
- Future trials will assess compatibility with other biocontrol agents, use of supplemental food or banker plants and risk of crop damage.
- If needed, mass-rearing methods will be developed.

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