

Life-history traits and predation of *Chrysopa* sp. lacewings on aphids and mealybugs

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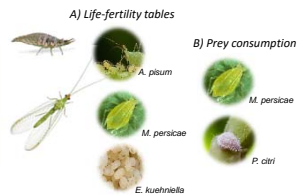
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The family Chrysopidae includes about 1200 different species of predatory insects. The larvae of all species are voracious and feed on key pests of crops such as aphids, scale insects, lepidopteran and coleopteran eggs, thrips and spider mites (Canard et al. 1984, Pappas et al. 2011). Although most chrysopids exhibit their predatory capacity as larvae, *Chrysopa* species feed on prey both as larvae and adults. The ability of these species to consume prey for a longer time period during their life extending from the larval stages to the end of adult life, may be an important advantage for their use in biological control. Despite their great potential as biological control agents of important pests, our knowledge about their biology and their pest suppression efficiency is rather limited.

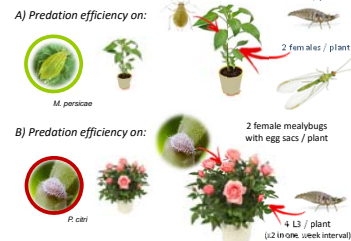
Materials and Methods

Experimental system

Laboratory



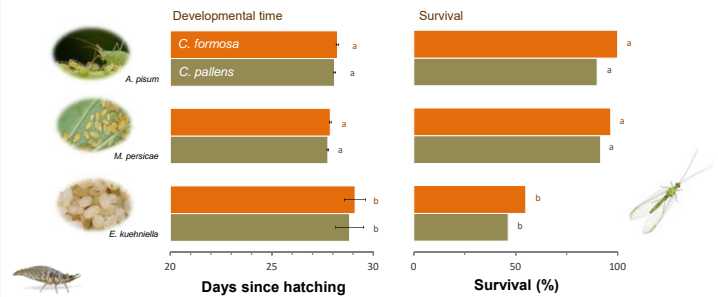
Greenhouse



We assessed the effect of food on the life-history traits of *Chrysopa formosa* and *C. pallens* when fed on natural prey (aphids) and factitious food (*Ephesthia kuehniella* eggs) and estimated their predation on two prey (*Myzus persicae* and *P. citri*) in laboratory and greenhouse experiments.

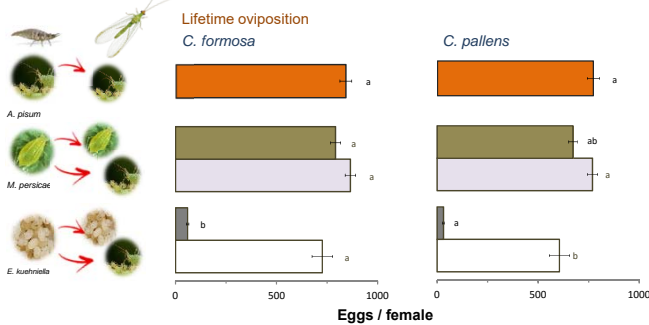
Juvenile development

Results 1



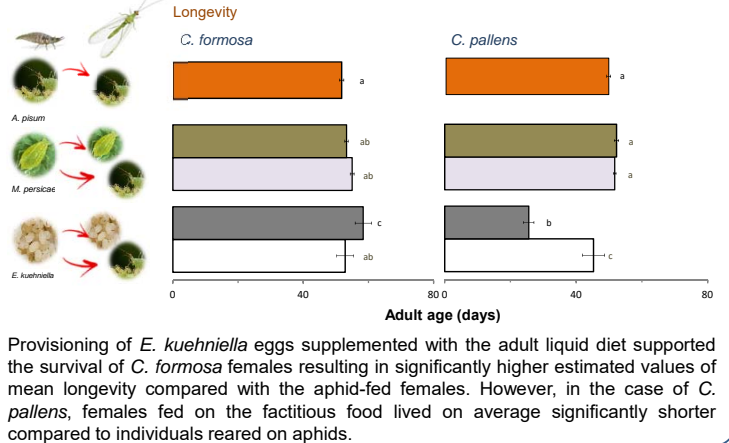
Developmental time and survival to the adult stage were both significantly affected by the food provided to the lacewing larvae. Developmental time significantly increased in the group reared on *E. kuehniella* eggs whereas survival rates decreased to 46 and 53% for *C. formosa* and *C. pallens*, respectively. Survival of both lacewing species was high when reared on the two aphid species ranging from 80 to 100%.

Egg production and female longevity



Switching between the different aphid species or the factitious food from during juvenile development to either aphid species as the adult food had a minor or no significant effect on female lifetime oviposition. However, the factitious food supplemented with the adult liquid diet was proven insufficient to support adults oviposition.

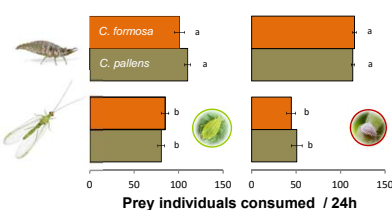
Results 2



Provisioning of *E. kuehniella* eggs supplemented with the adult liquid diet supported the survival of *C. formosa* females resulting in significantly higher estimated values of mean longevity compared with the aphid-fed females. However, in the case of *C. pallens*, females fed on the factitious food lived on average significantly shorter compared to individuals reared on aphids.

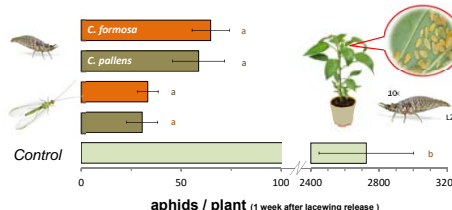
Results 3

Predation (24h)



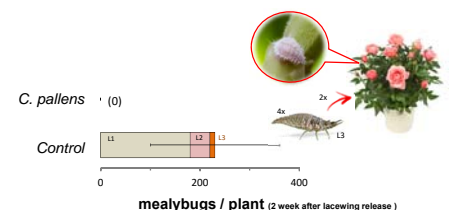
Predation efficiency of the two lacewings was similar under laboratory conditions. Larval prey consumption was significantly higher compared to adult predation. A similar trend was recorded against both pest species.

Predation (greenhouse pepper)



Predation efficiency of both lacewing species against *M. persicae* in pepper plants was similar. The adult females were proven more efficient predators compared to the 2nd instar larvae of both lacewings.

Predation (greenhouse roses)



Early release of 3rd instar larvae of *C. pallens* on potted rose plants infested with the mealybug *P. citri* resulted in the complete eradication of the pest within two weeks.

Conclusion

Our results show that *C. formosa* and *C. pallens* are promising biological control agents for aphids and mealybugs. Further research is required in the field to optimize their use in pest control.

Acknowledgements

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References

Canard, M., Séméria, Y., New, T.R. (1984). Biology of Chrysopidae. Dr. W. Junk Publishers, The Hague, 294pp.
Pappas, M.L., Broufas, G.D., Koveos, D.S. (2011). Chrysopid predators and their role in biological control. Journal of Entomology 8(3): 301-326.