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Developing a subpopulation-based model for the olive fruit fly *Bactrocera oleae* (Diptera: Tephritidae): conceptual model outline

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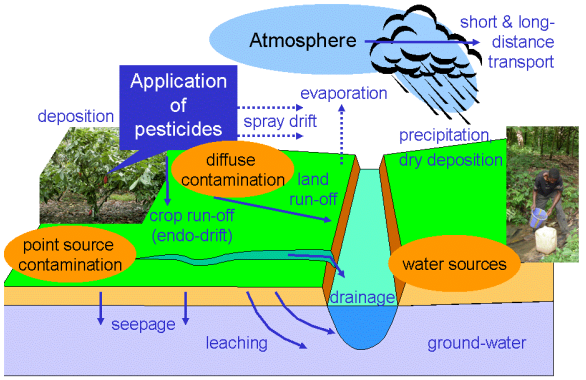
Monoculture dedicated land-use and intensive agricultural practices favour specialization and spreading of pests, which is partly mitigated by pesticide application but leads to environmental problems.



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Natural pest control is an ecosystem service that can be alternatively used to pesticide application. This consists in predator insects consuming pest insects, and it's innerent to nature functioning. No need for direct application. ☺

If we can simulate animals in their enviroment through computational models, we can predict ecosystem behaviour and therefore use ecosystem services efficiently.

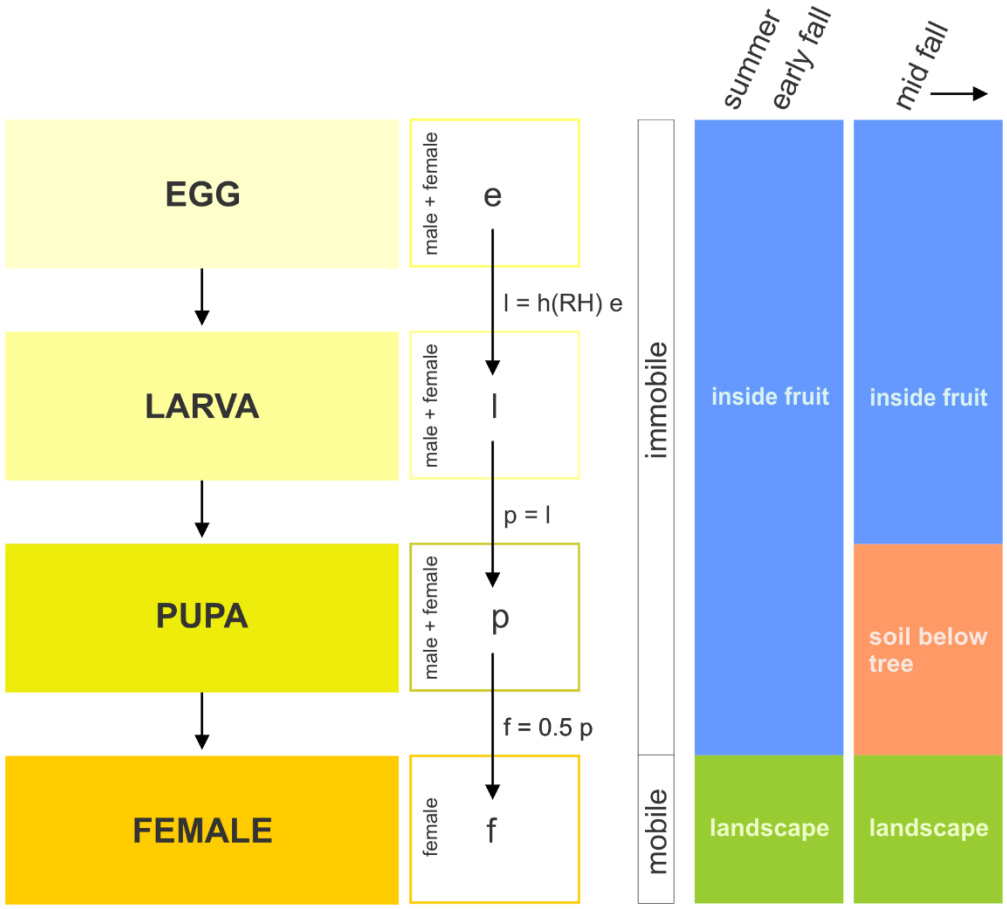
Steps for model development

Animal life story → **Conceptual model** → Computational model

Here we present the outline of the conceptual model being developed for *Bactrocera oleae* Rossi, the key pest of olives in the Mediterranean.

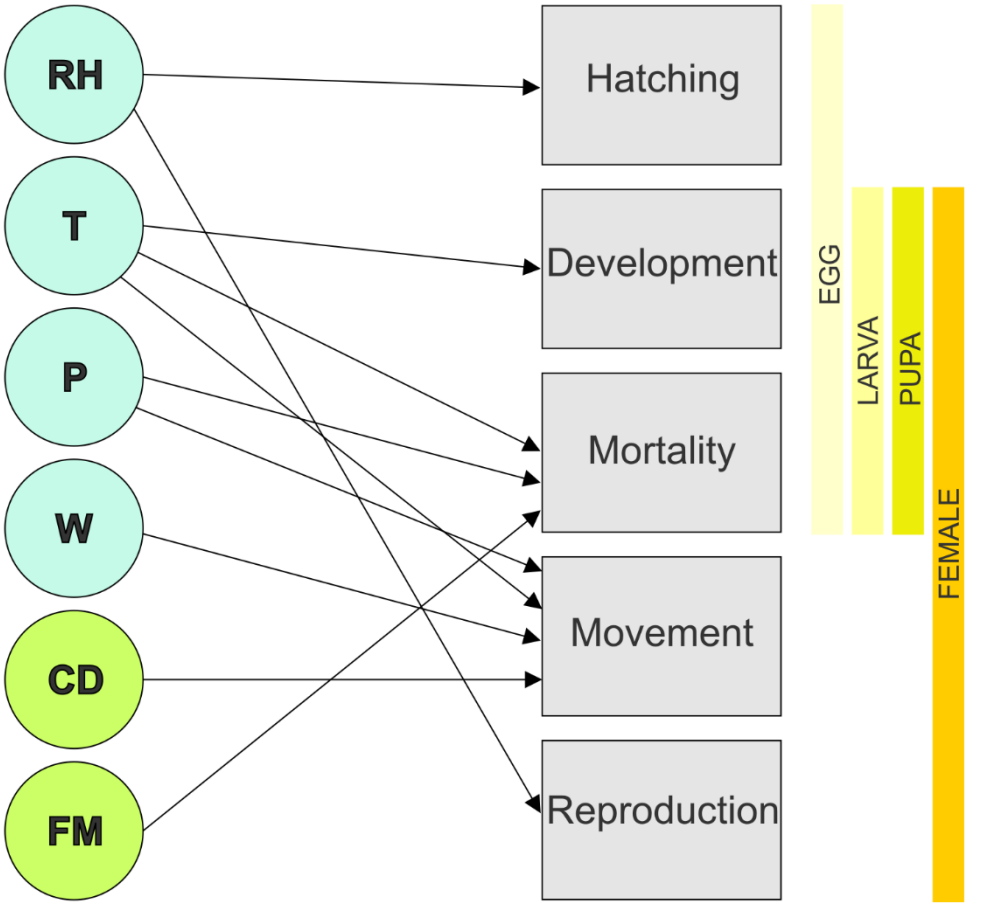
This species is fully adapted to olive groves.

Life stages of *B. oleae* and other features considered in this model



RH is daily air relative humidity
T_a is daily air temperature
T_s is daily soil temperature
V is daily wind intensity
e is number of egg individuals
l is number of larva individuals
p is number of pupa individuals
f is number of female individuals
h(RH) is a function of RH expressing a percentage of egg hatching

Variables and functions comprised in this model



RH is daily air relative humidity
T is daily air or soil temperature
P is daily precipitation
W is daily wind intensity
CD is crop development
FM is farm management

Final remarks

- The conceptual model for *B. oleae* is in its final stage of development.
- Coding and calibration using daily climate variables and data relative to individuals sampled in 2011 and 2012 in a study site are the next steps of this work.
- Daily climate data have been calculated from hourly measurements at the study site.
- The landscape model for that study site is also being developed.
- We expect that the future simulations will help to better understand *B. oleae*'s behavior in its environment.

Thank you.