



# The effects of temperature on the development and mortality of *Eretmocerus warrae* (Nauman & Schmidt)

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# Greenhouse whitefly



Direct feeding



Vector of virus infection



Sooty mould caused by honeydew release

# Life cycle of greenhouse whitefly



Eggs



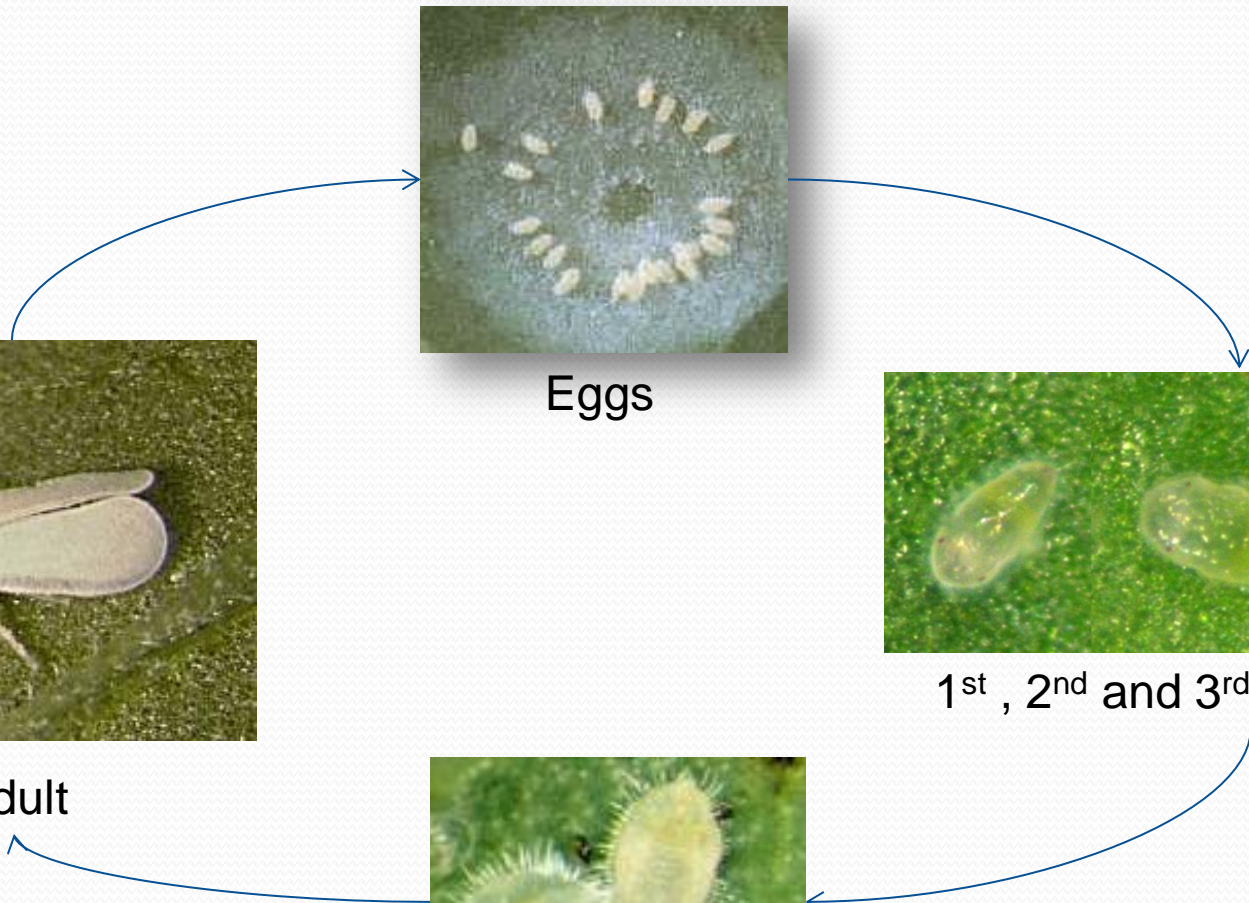
1<sup>st</sup> , 2<sup>nd</sup> and 3<sup>rd</sup> instar nymphs



Pupa



Adult



# Biological control by parasitic wasps



*Encarsia formosa*



*Eretmocerus mundus*



*Eretmocerus warrae*

# Trophic interactions



Greenhouse whitefly



*Eretmocerus warrae*



Tomato plants

# *Encarsia formosa*

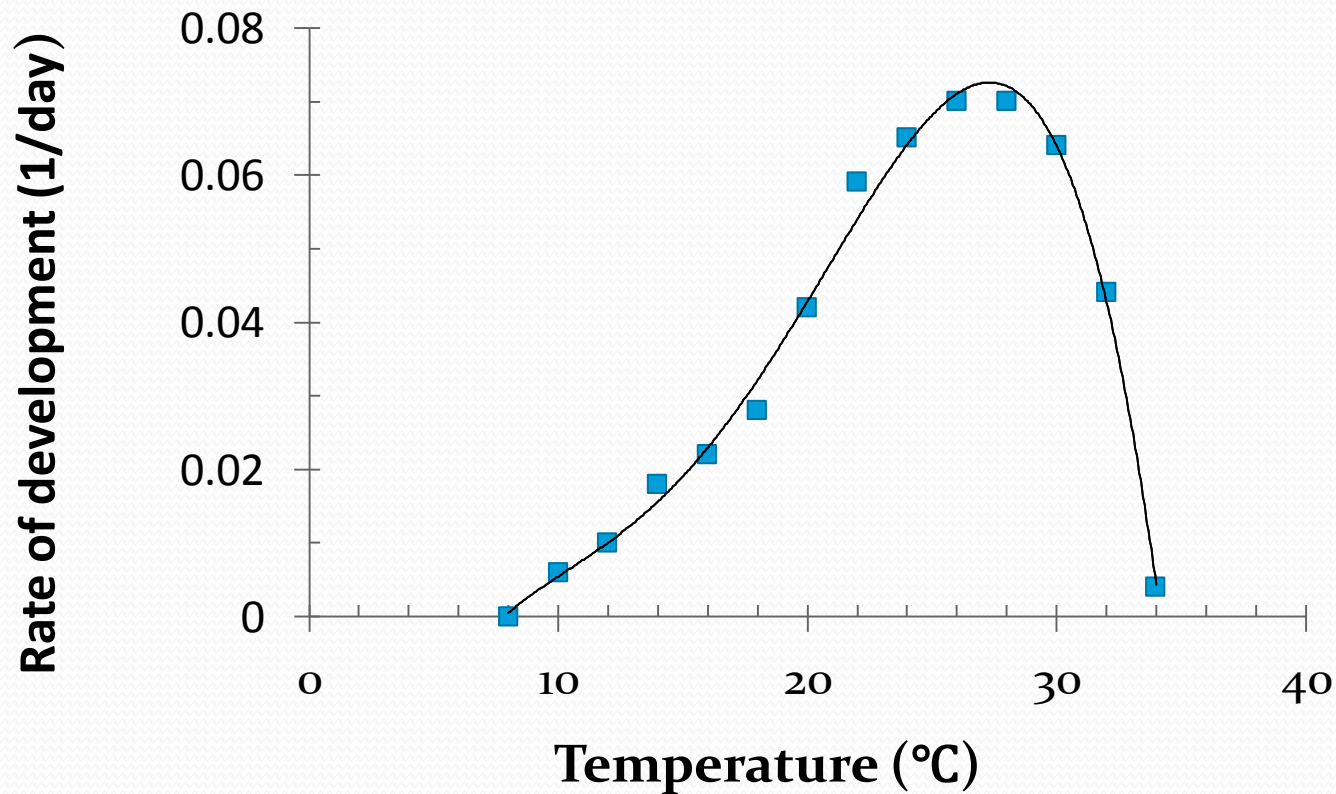
Status:

- Most widely used
- Effective control



*Encarsia formosa*

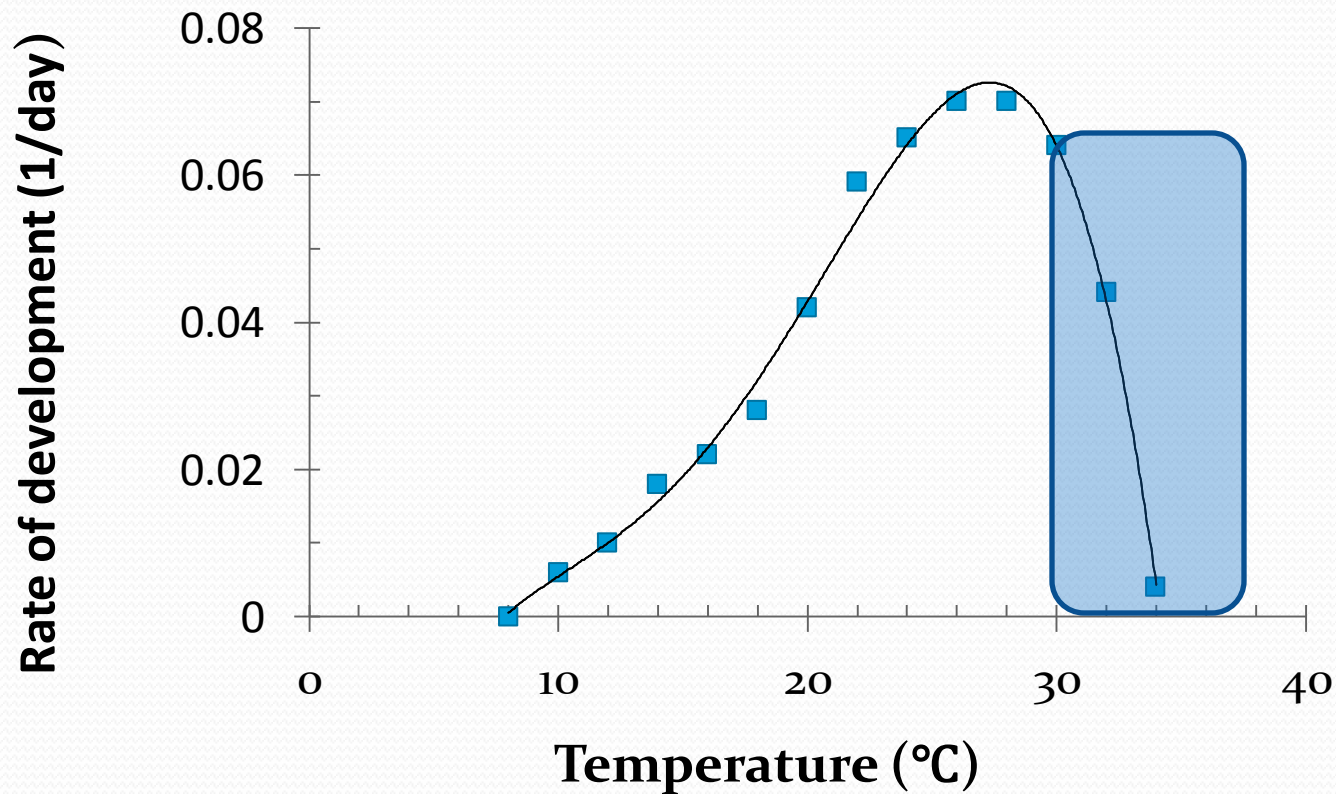
# Temperature-dependent development of *Encarsia formosa*



(Briere et al., 1999)

# Limitation

**Weakness:** limited tolerance for extreme temperatures



(Briere et al., 1999)



# *Eretmocerus warrae*

## Status:

- A newly described species
- A commercial product now
- Supposed to have a broader tolerance for extreme temperatures



*Eretmocerus warrae*

# Research questions

- How does temperature affect the development and fecundity of *E. warrae*?
- What is the effect of high temperature on *E. warrae*, compared with *En. formosa*?

# Significance of the project

- Understanding temperature effects on *E. warrae*
- Using *E. warrae* effectively

# Effects of temperature on developmental rate of *E. warrae*



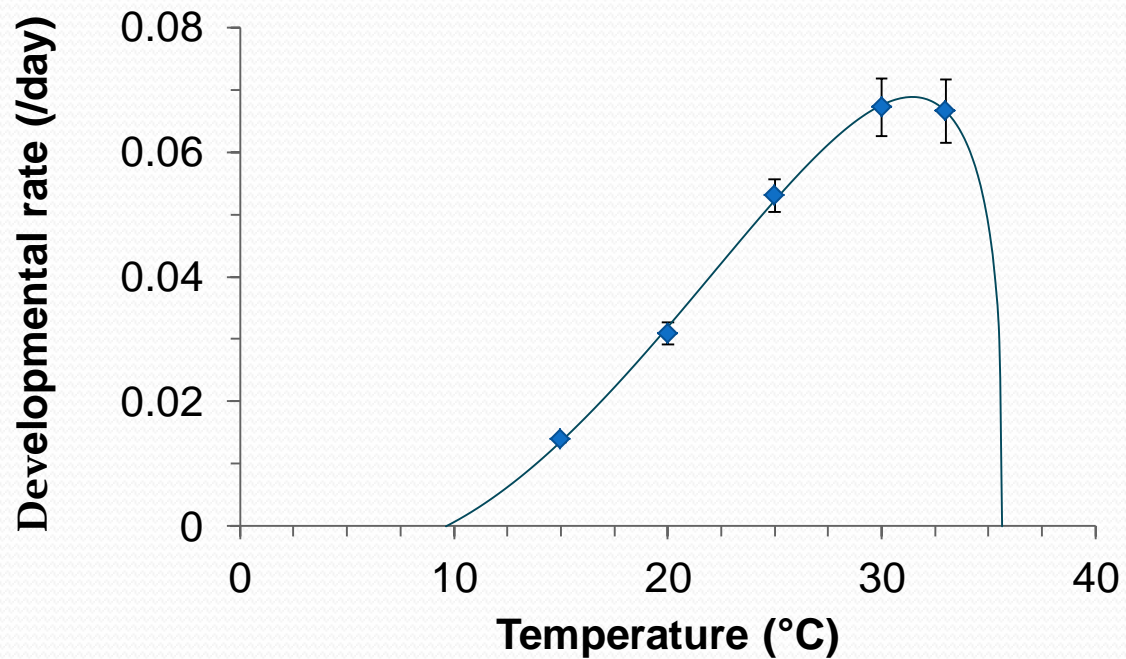
Tomato plant infested with 2<sup>nd</sup> instar greenhouse whitefly nymphs with clip cages

3 clip cages/plant \* 4 plants

Temperatures (°C)	Number of wasps in each clip cage
15	13
20	4
25	3
30	2
33	2

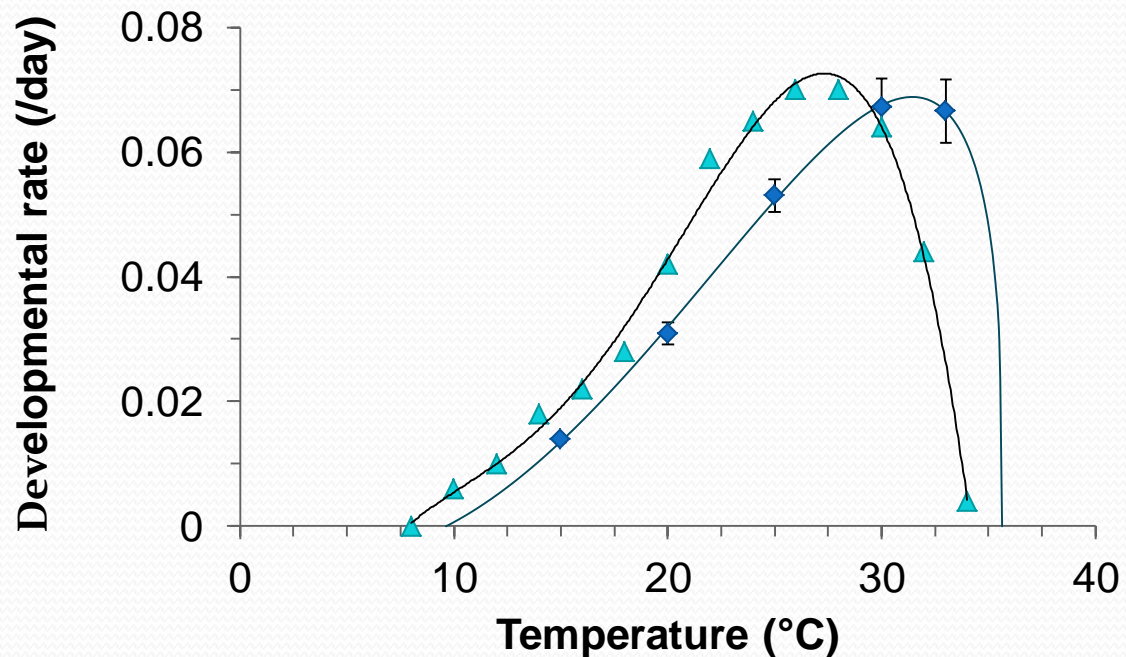
# Effects of temperature on development of *E. warrae*

Temperature-dependent developmental rate of *Eretmocerus warrae*



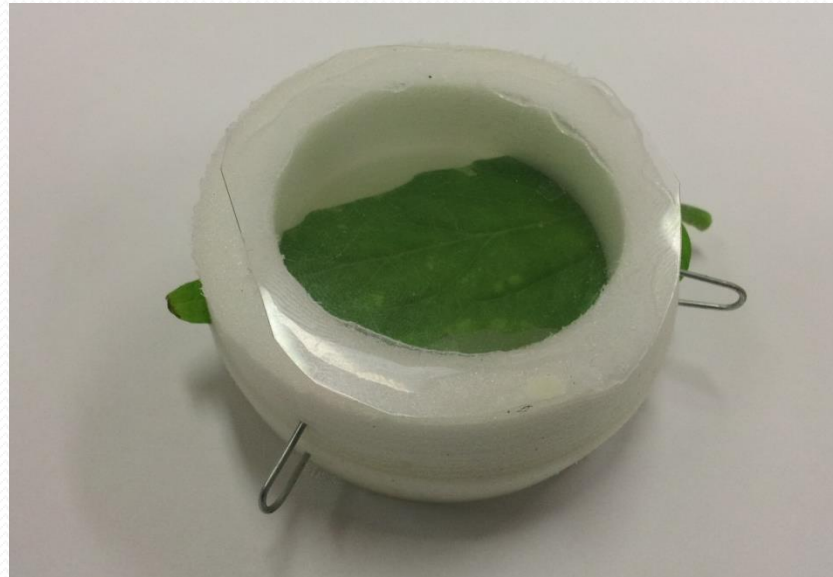
# Effects of temperature on development of *E. warrae*

Temperature-dependent developmental rate of *Eretmocerus warrae* vs *En. formosa*



# Effects of temperature on oviposition

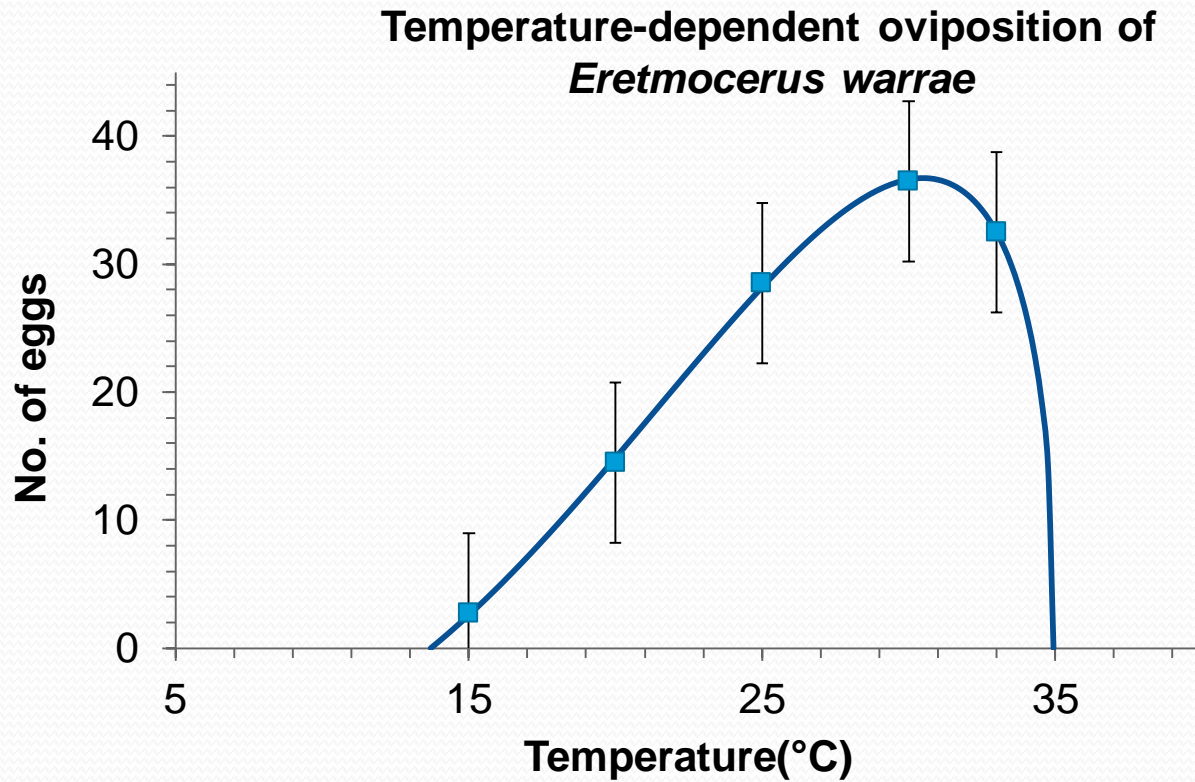
Aim: Investigate oviposition by *E. warrae* at different temperatures



Tomato leaf infested with 2<sup>nd</sup> instar greenhouse whitefly nymphs in clip cage

4 wasps \* 4 replicates (3 hours)

# Effects of temperature on oviposition





# Effects of higher temperature on developmental rate of *E. warrae* & *En. formosa*

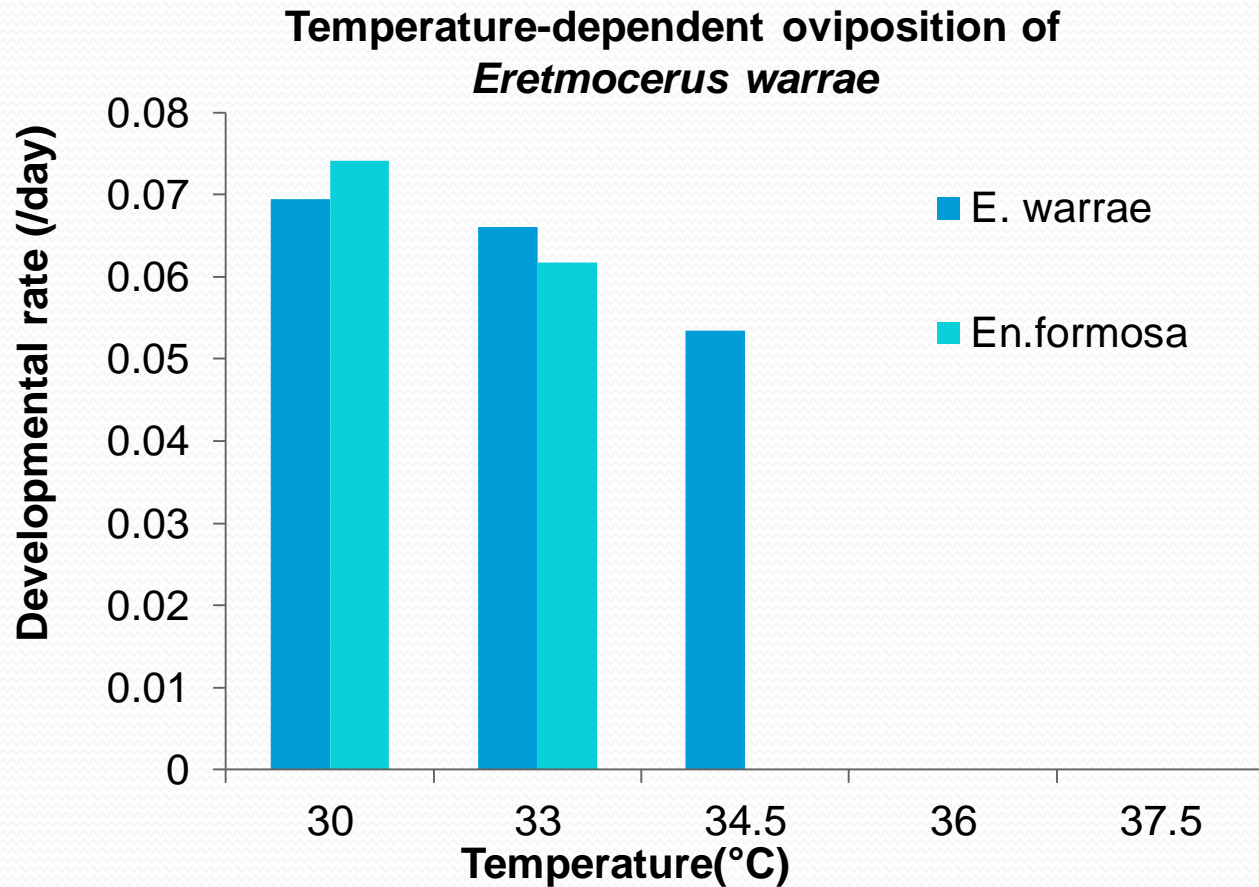


Tomato plant infested with 2<sup>nd</sup> instar greenhouse whitefly nymphs with clip cages

3 clip cages/plant \* 4 plants

Temperatures (°C)	Number of wasps in each clip cage
30	6
33	6
34.5	9
36	18
37.5	36

# Effects of high temperature on development



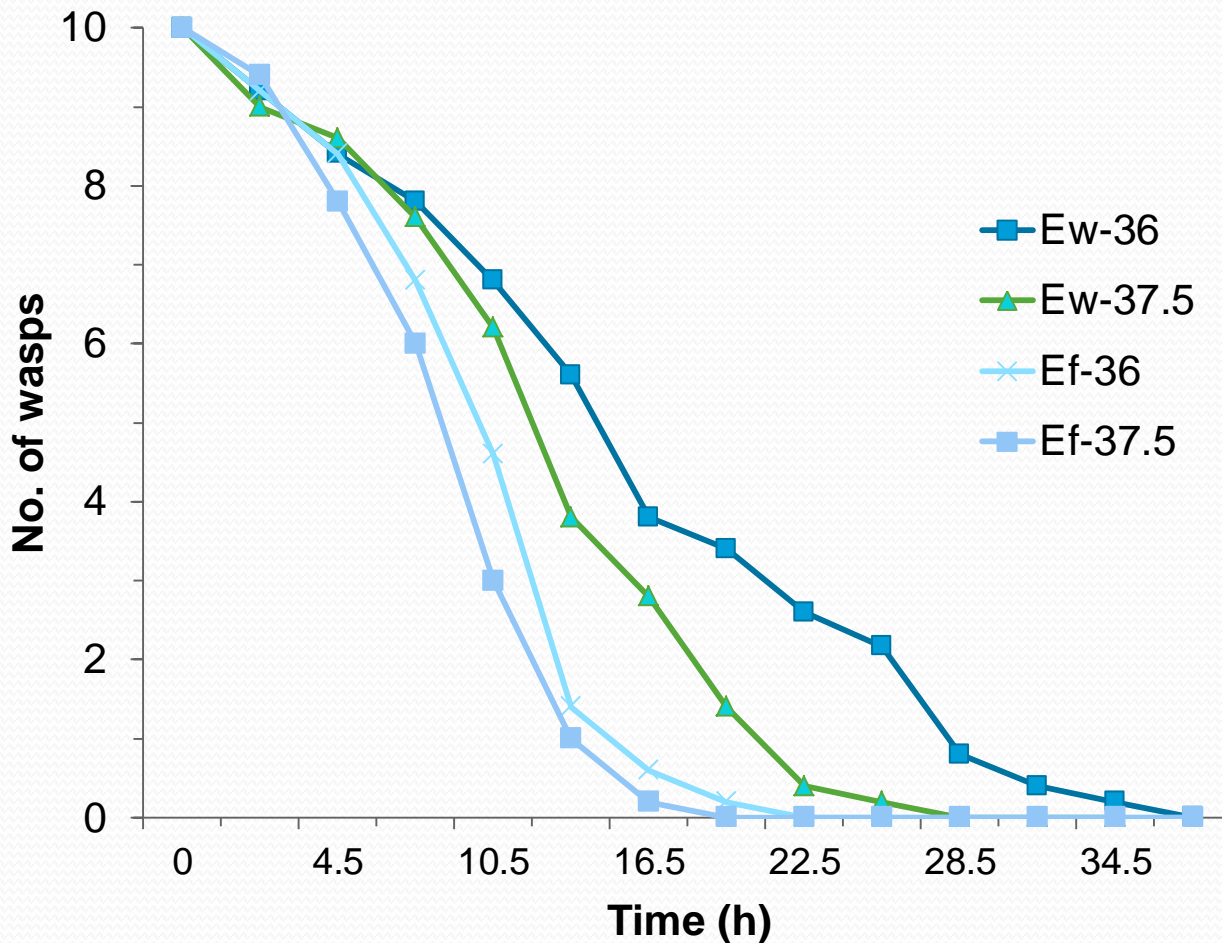
# Mortality of *E. warrae* vs *En. formosa* after short exposure to high temperature



Temperatures:  
36 & 37.5°C

10 wasps \* 5 replicates

# Survival of *E. warrae* vs *En. formosa* after short exposure to high temperature



# Summary

- This research will give a broader understanding of *E. warrae*
- *E. warrae* could prove to be an alternative or supplement of *En. formosa*, particularly at high temperatures

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