Interspecific competition between egg parasitoids *Trichogramma pretiosum* and *Telenomus remus* on fall armyworm eggs

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Parasitoids Interactions

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Trichogramma pretiosum

Telenomus remus

Adult competition

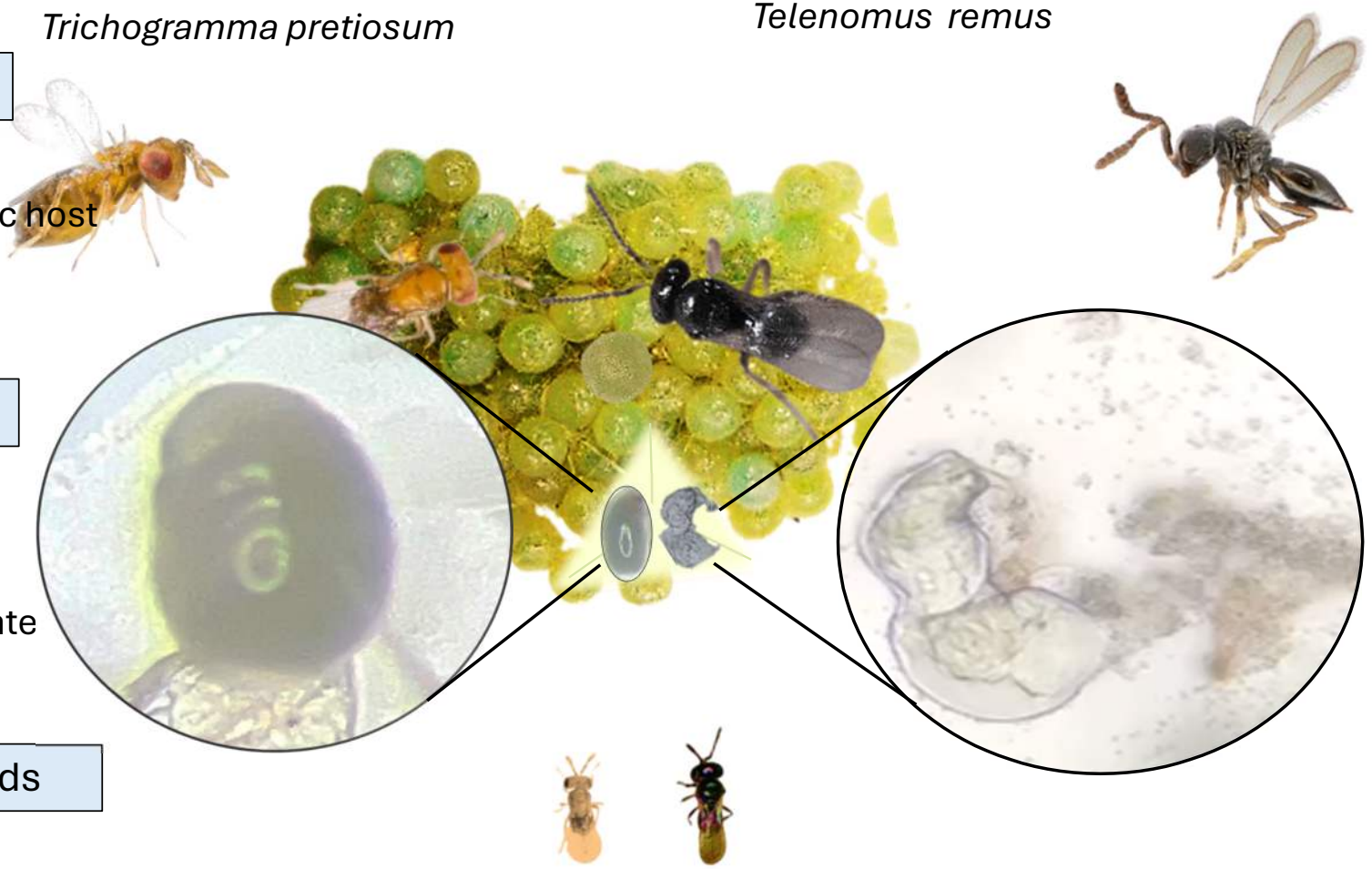
- Host finding efficiency
- Parasitism efficacy in specific host

Larval competition

- Physical attack
- Competition for resources
- Release of toxins
- Parasitoids developmental rate

Fitness of surviving parasitoids

- Sex ratio
- Longevity



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What does competition between parasitoids reveal?

Identify the "winner parasitoid", which is the species that outcompetes others in exploiting the shared host

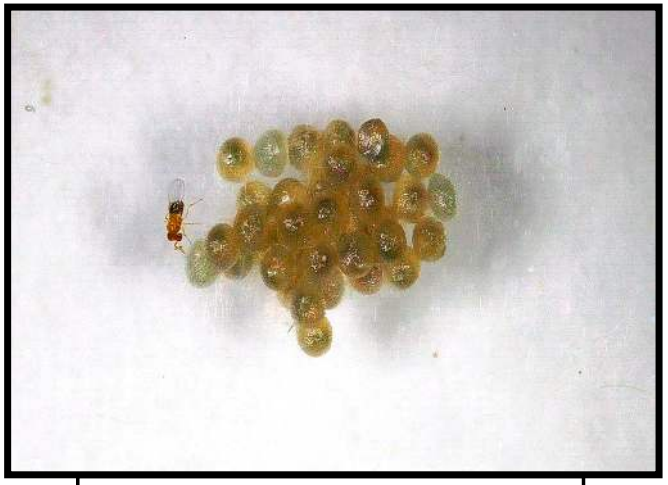
Overall, helps enhance biocontrol program of FAW

Previous study: Host egg density driven dynamics in competitive and non-competitive interactions

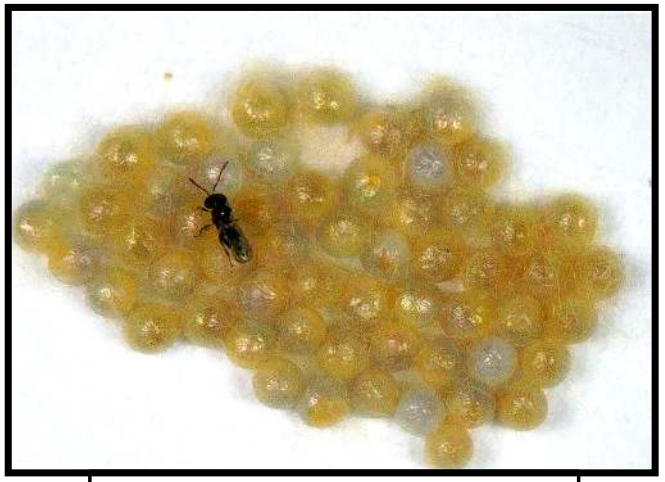
Competition

Isolation

Exposure of FAW eggs to both the parasitoids



Exposure of FAW eggs to Trichogramma



Exposure of FAW eggs to Telenomus

FAW egg densities for each treatment: 15, 30, 60

PARAMETERS RECORDED:

- Parasitism rate
- Sex ratio
- Developmental time

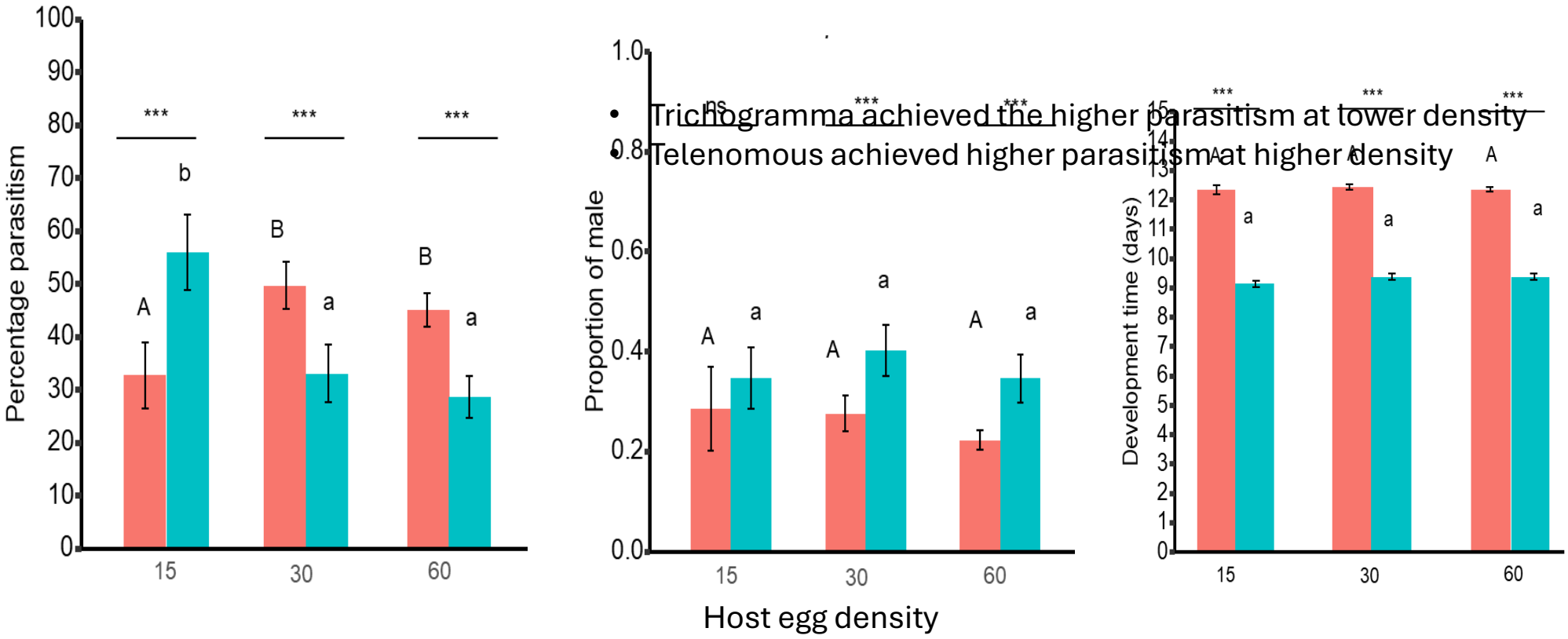
Host egg density driven dynamics in competitive Interactions

T. remus *Tr. pretiosum*

Percentage parasitism

Sex Ratio

Development Time

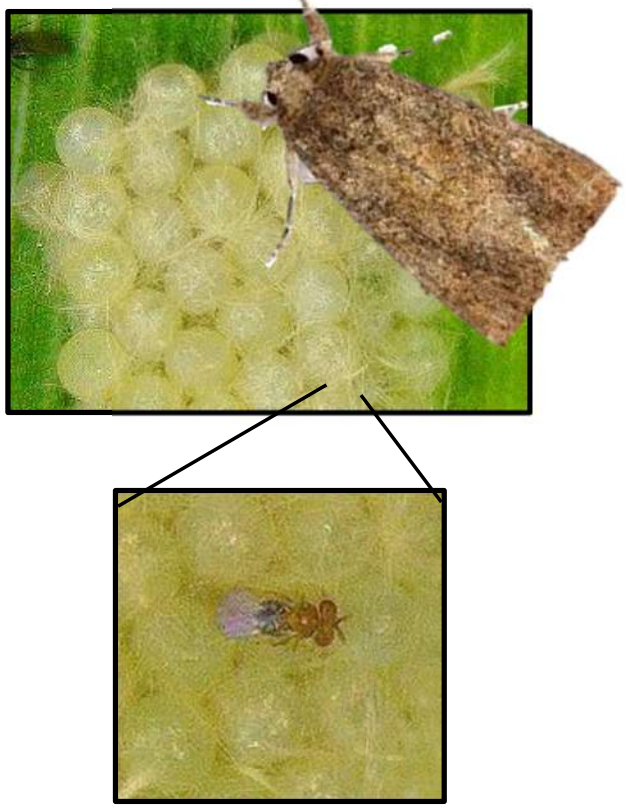


- Trichogramma achieved the higher parasitism at tower density
- Telenomous achieved higher parasitism at higher density

Different upper case letters indicate significant differences among density levels for *T. remus* parasitism. Different lowercase letters indicate level of significance among the density levels for *Tr. pretiosum* parasitsim. “ns”, “*”, “**”,and “***” indicate an insignificant difference ($p > 0.05$), and significant difference at the 0.05, 0.01, and 0.001 level, respectively, between *T. remus* and *Tr. pretiosum*.

Parental care in Faw and parasitoids impacting interspecific competition

FAW eggs covered with hair by the mother

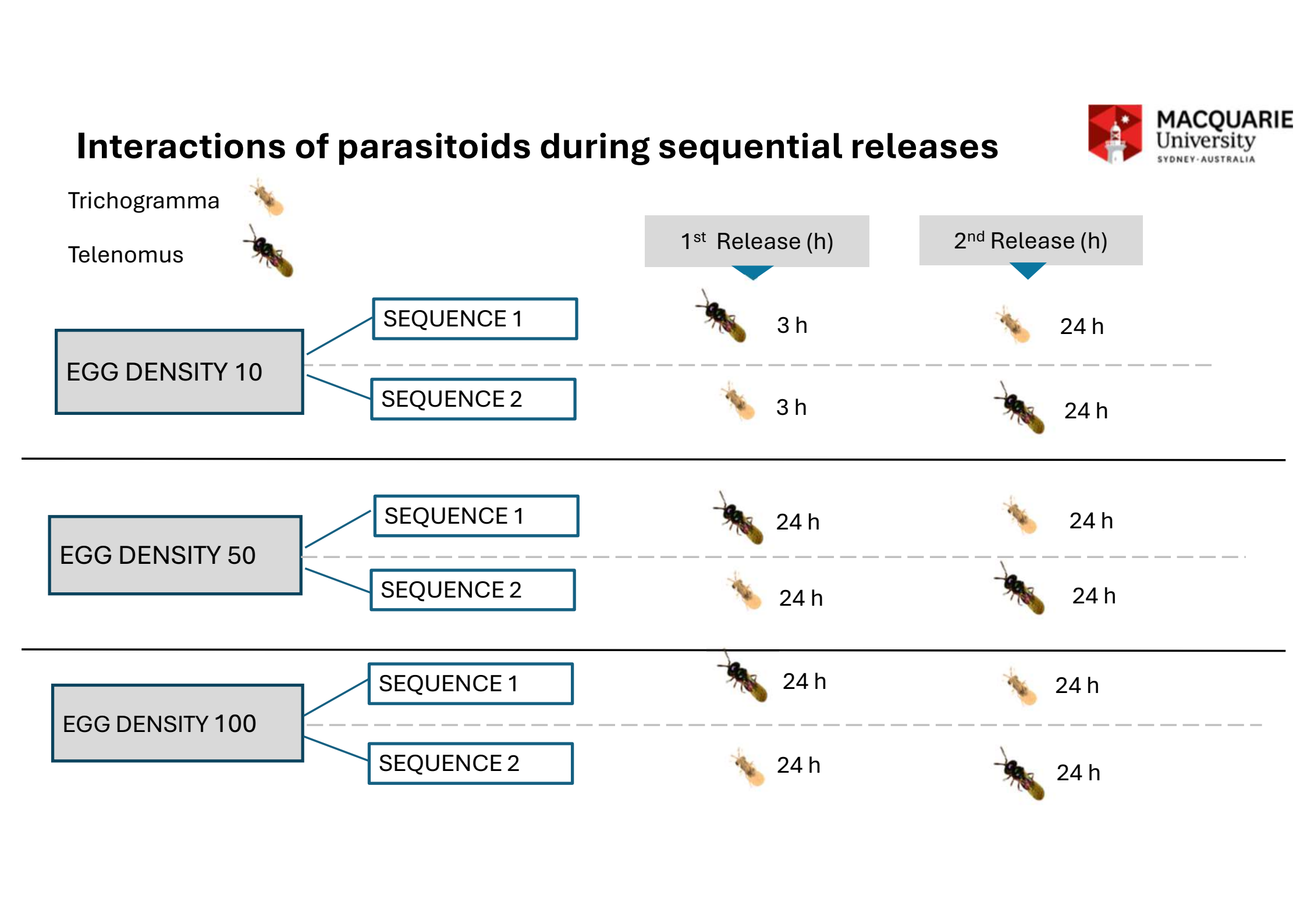


Trichogramma facing a challenge while laying eggs in hairy FAW eggs

Parasitoids while laying eggs inject substances lethal for the development of heterospecific parasitoid species

Note: *Trichogramma* is gregarious and that substance do not affect multiple *Trichogramma* developing inside host eggs

Interactions of parasitoids during sequential releases

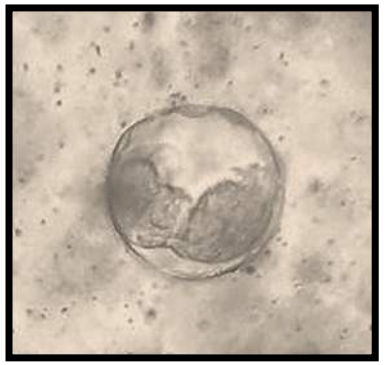


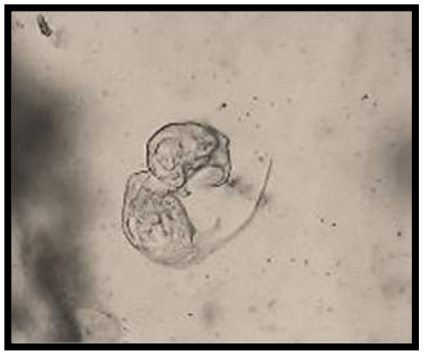
Events representing stages of embryonic development in FAW eggs for : Telenomous Trichogramma

Hatching

Telenomous remus

Shed chorion





19-20 hr post Egg laying

2 hr post egg laying

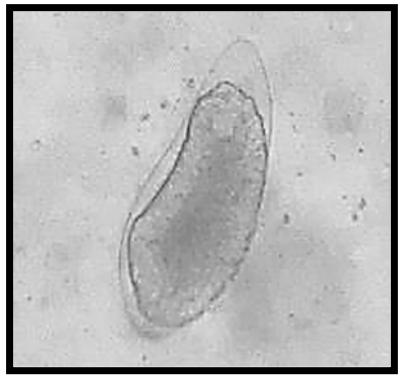
4 hr post egg laying

12 hr post egg laying

18 hr post egg laying

24 hr post Egg laying

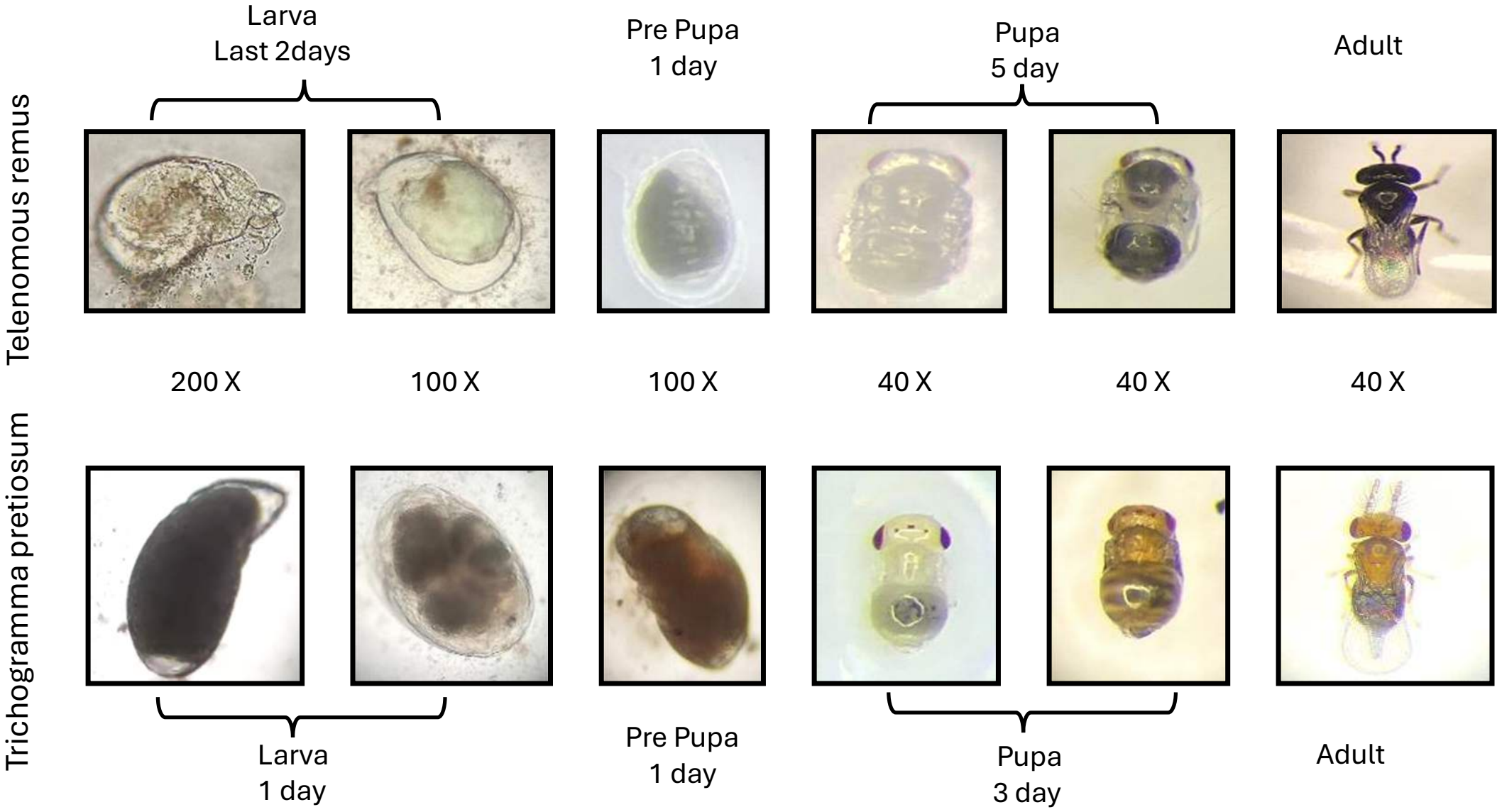
Trichogramma pretiosum



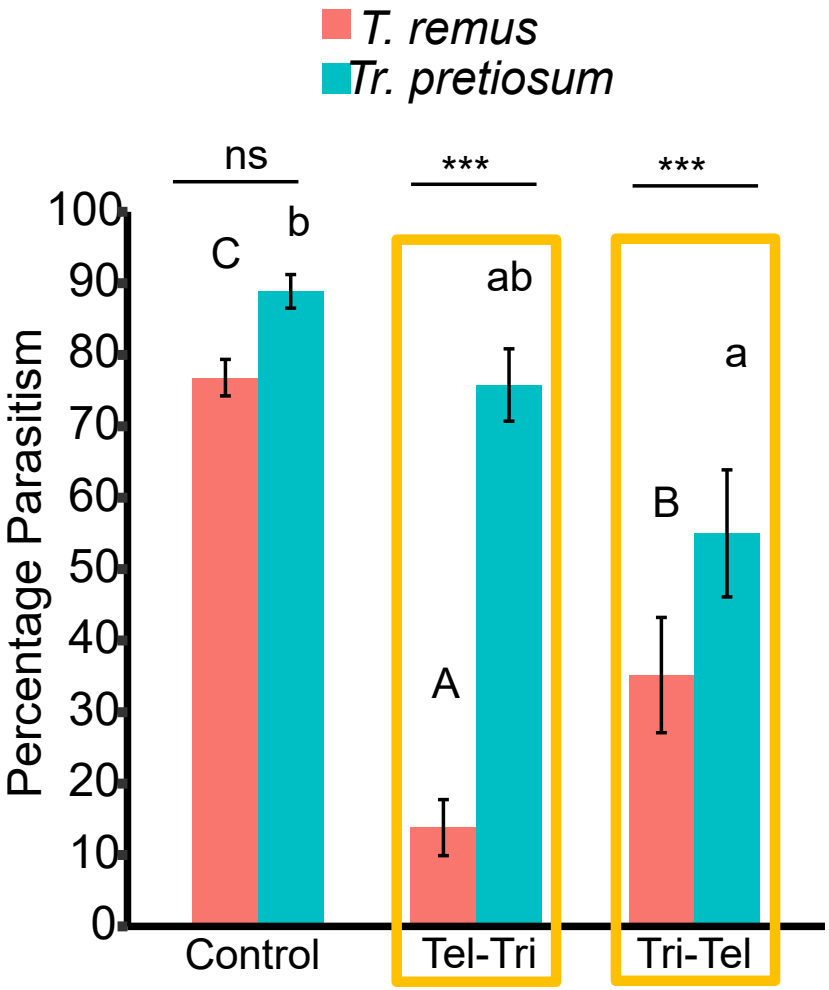
Shed chorion

Hatching

Post embryonic development Development of parasitoids in FAW eggs

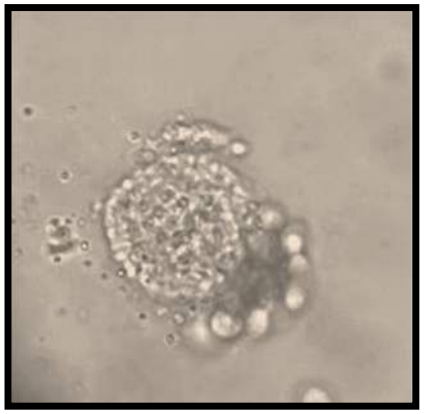


Percentage of parasitism on FAW Eggs at density 10

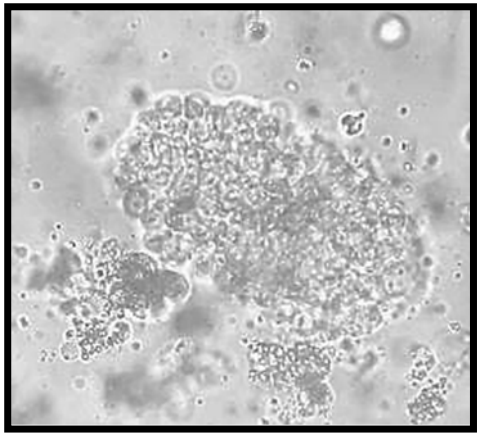


Trichogramma Healthy

Telenomous deformed

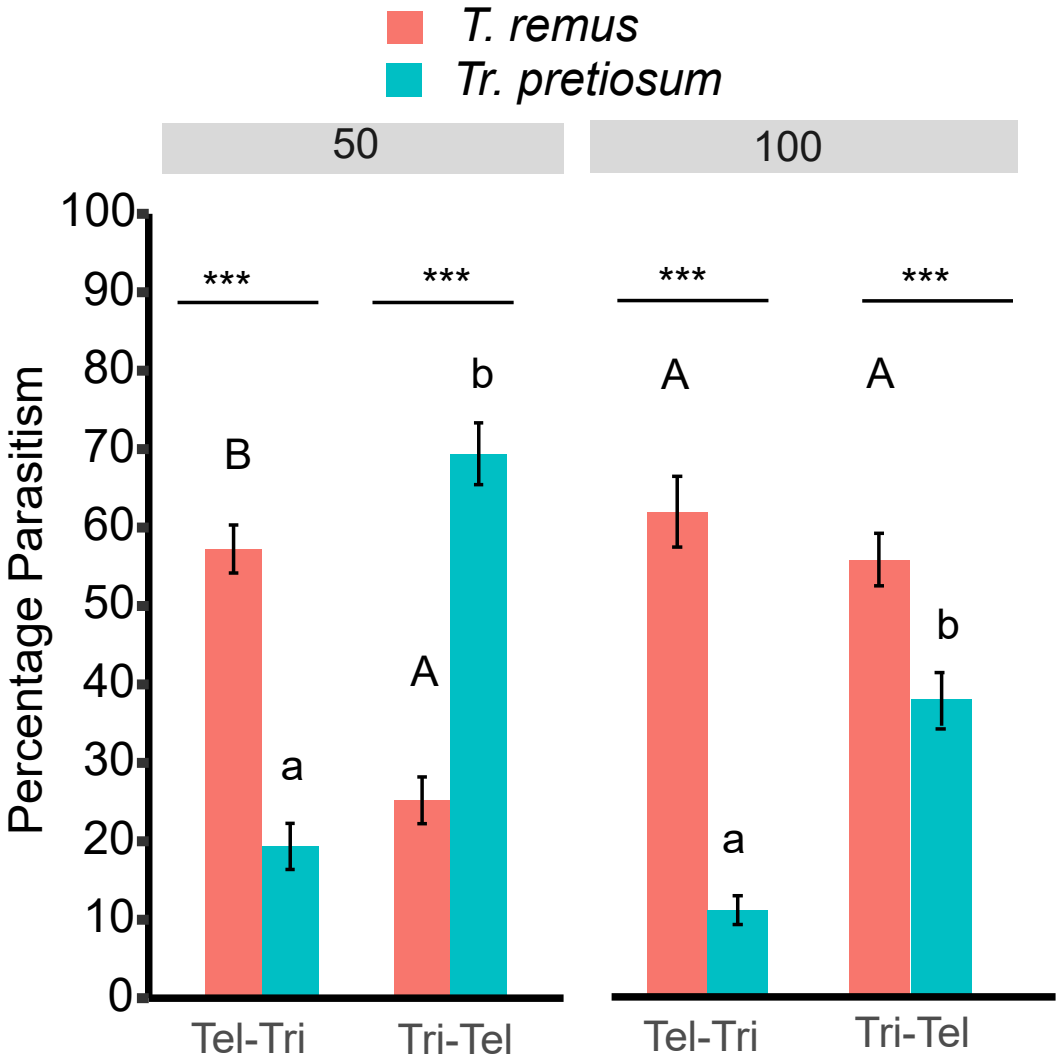


Trichogramma Deformed



Telenomous Healthy

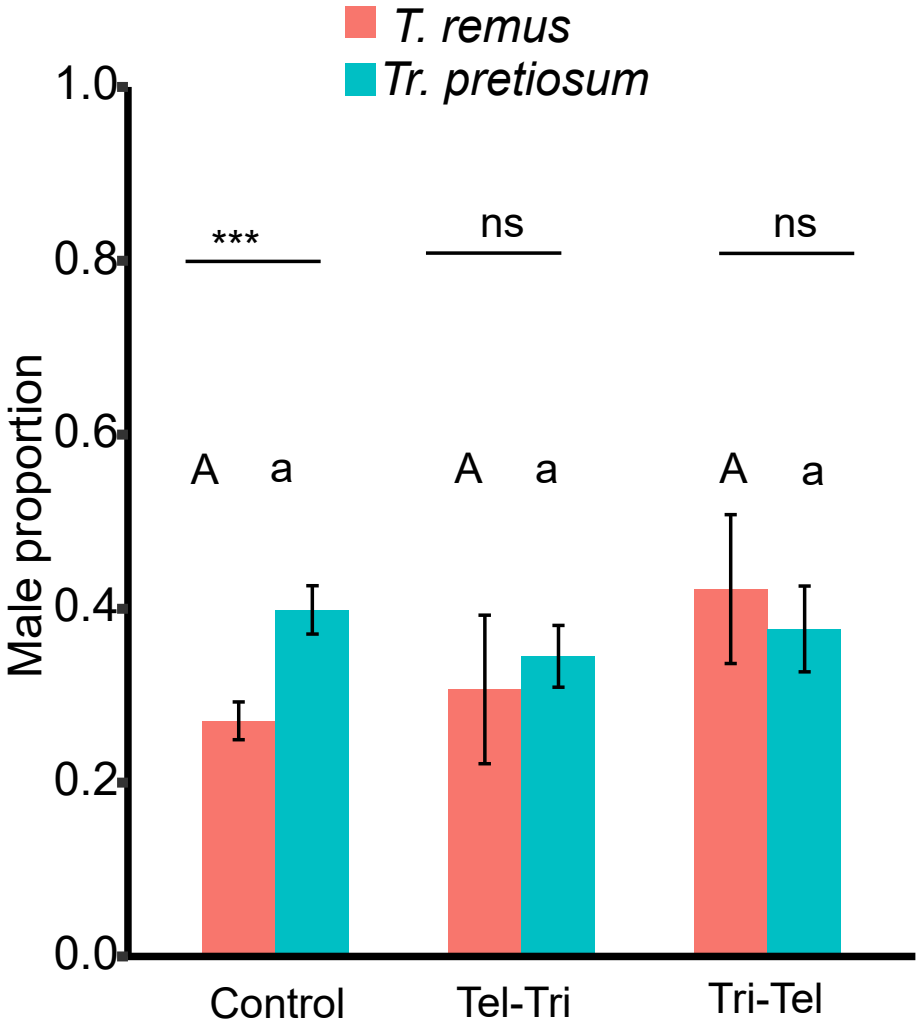
Percentage of parasitism on FAW Eggs at density 50 and 100



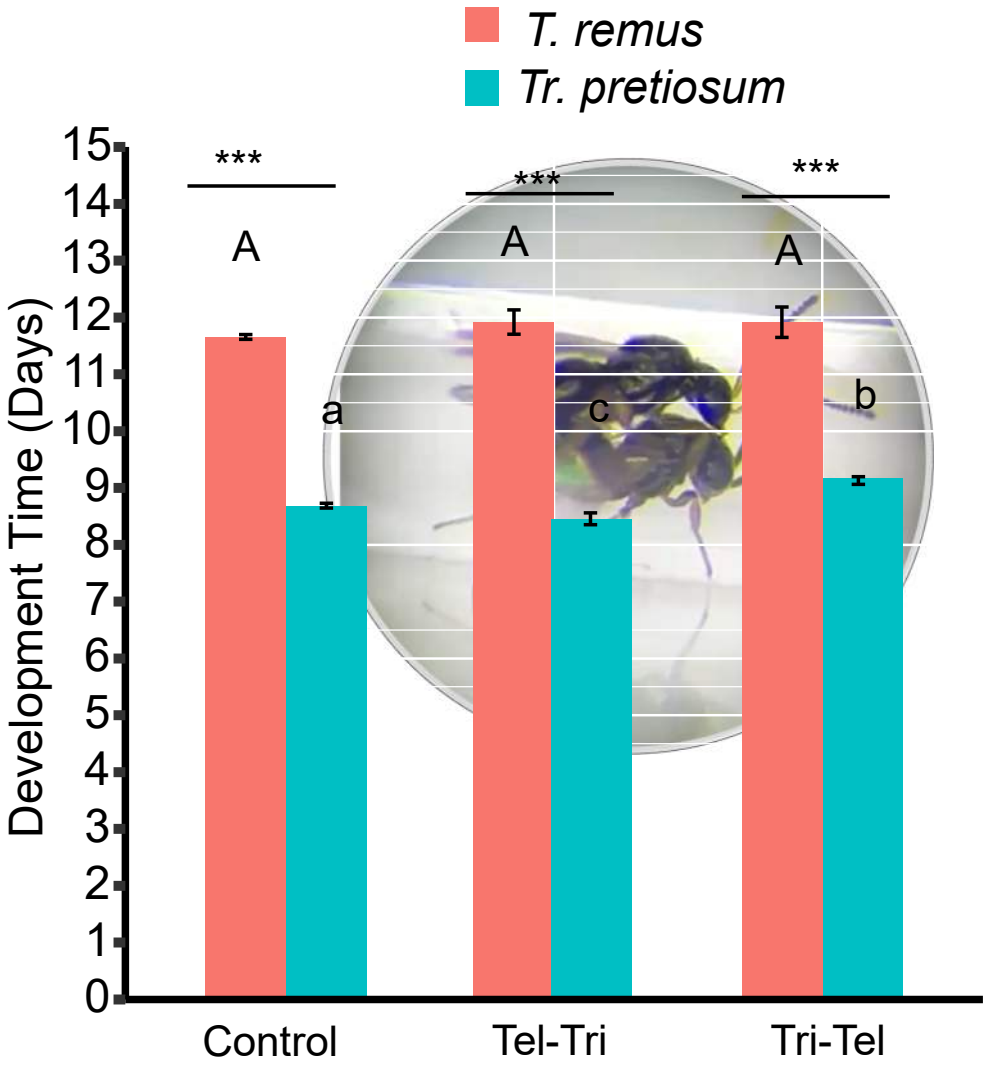
Telenomous

Trichogramma

Sex ratio on FAW eggs at density 10



Development time on FAW eggs density 10



Conclusions

- Success of Trichogramma at low densities
- Dominance of Telenomus at higher densities
- Sex ratio of Telenomus is more female-biased

For sequential release

- Low density: Trichogramma was successful irrespective of the sequence
- Medium density : Whichever parasitoid encounters the host first wins
- High Density: Telenomous was successful irrespective of the sequence of release

Overall, laboratory assays show Telenomus as a better candidate

Cost-effective rearing on a commercial scale of Telenomus and its augmentation would enhance biological control of FAW

Lab Members

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THANKS!

Any Questions?

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