Effects of Royal Jelly in Combination With Juvenile Hormone Agonists and Antagonists on *Drosophila melanogaster*

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Abstract

- Royal Jelly (RJ) is associated with increased ovary size and rapid maturation (Kamakura, 2011).
- Juvenile Hormone (JH) maintains adolescent morphology and physiology in juvenile invertebrates
- Pivot 10 is an insecticide using pyripoxyfen, a juvenile hormone analog, as the active agent
- We hypothesized that RJ and "Pivot 10" JH analog would have interacting effects, altering developmental time course, mortality and reproductive patterns

Methods

Treatment Groups:

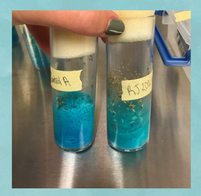
- (Control) 20mL water + 20mL media
- (JH) 20mL JH 0.01% + 20 mL media
- (Pivot 10) 20mL Pivot 10 0.01% + 20 mL media
- (RJ) 20mL RJ 20% + 20 mL media
- (JH + RJ) 20 mL JH 0.01% RJ 20% + 20 mL media
- (Pivot 10 + RJ) 20 mL Pivot 10 0.01% RJ 20% + 20 mL media

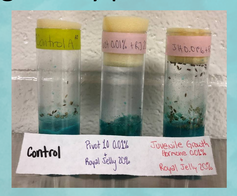
Experiment 1:

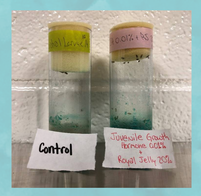
10 adult drosophila/treatment group allowed to breed for 8 days prior to removal. F1 generation monitored for presence of larvae (Y/N), number of pupations, and number of successful hatches over a 12 day period.

Experiment 2:

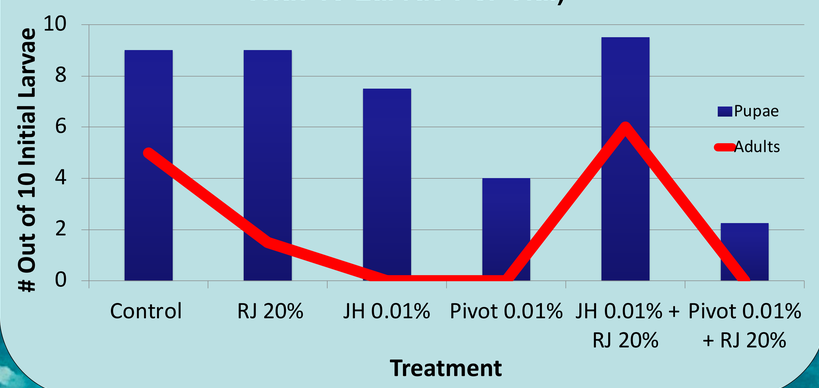
10 larvae from a control breeding colony were placed into each treatment. Measured presence of larvae (Y/N), number of pupations, and number of successful hatches over the succeeding 20 day period.



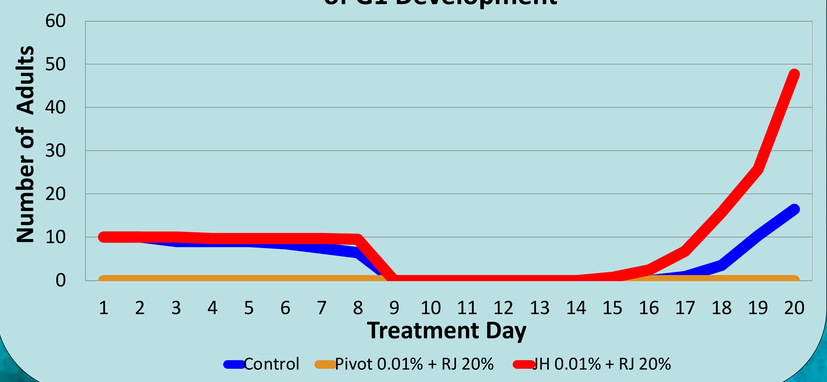




Number of Pupations Verses Hatches Compared Against Treatment Group (Beginning With 10 Larvae Per Vial)



Number of Adults Recorded over 8 Days Starting With 10 F1 (removed on 8th day) Followed By 12 days of G1 Development



Results

- Both JH 0.01% and Pivot 0.01% induced pupation but produced a 0% hatch rate
- RJ 20% increased reproduction
- RJ prevented mortality against JH but not against Pivot 10.
- Results suggest a complex, parallel rather than hierarchic interaction between JH and RJ
- Further research is necessary to explain lethal effects of Pivot 10 and protective effects of RJ

Future Directions

1. How is RJ creating a protective effect preventing JH induced mortality?
2. Descriptions of the nature and location of RJ-sensitive receptors
3. Do interactions follow a similar pattern across other invertebrate taxa?

References

Kamakura, M. (2011). Royalactin induces queen differentiation in honeybees. *Nature*, *473*(7348), 478.

Acknowledgements

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