

Prevention of deformed wing virus infection in larval and adult honeybees (*Apis mellifera* L.) by dsRNA ingestion

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Introduction

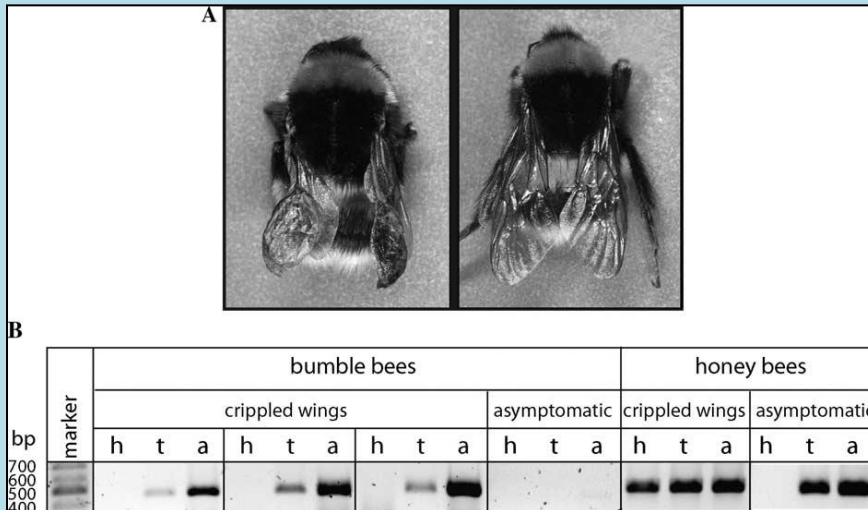
- Colony losses -2006-2010
 - USA-34% - 46%
 - Canada-34 -36%
 - Manitoba-35% -36%
- Varroa, Viruses, *Nosema*, presence of pesticides, poor nutrition and other stressors



Currie, Pernal, & Guzman-Novoa, 2010, VanEngelsdorp, 2009

DWV damage on bees

- DWV- crumpled wings, reduced body size
 - Early death of deformed bees
 - Short life span of normal winged bees
- Death of colony
- Honey production
- Death in overwintering colonies

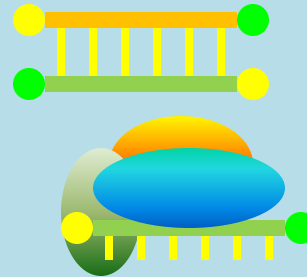
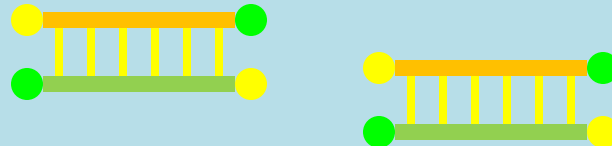


RNA interference

dsRNA

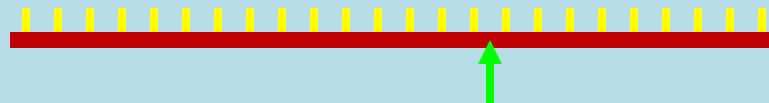


siRNAs 21-23bp



siRNAs are incorporated into RNA-induced silencing complex (RISC)

mRNA of virus



Adapted from Science video

Experimental design

- Larval experiment
- Replicated twice
- Adult bee experiment
- Replicated once



Larval experiment

- 5 Treatments

T1. dsRNA DWV+DWV

T2. dsRNA GFP+DWV

T3. DWV only

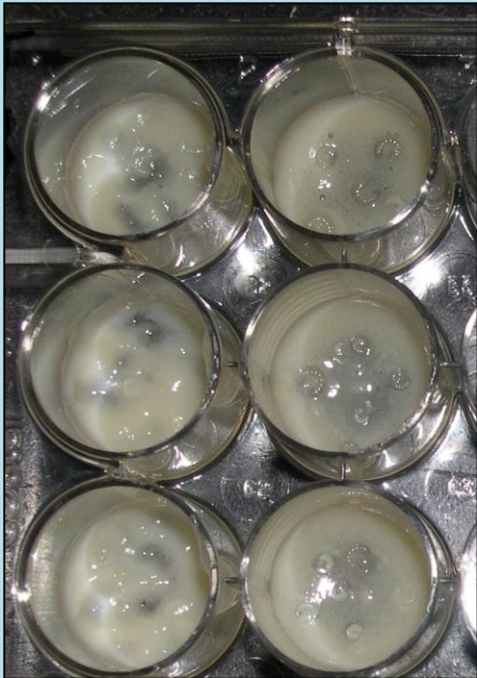
T4. Control-no treatment

T5. dsRNA only

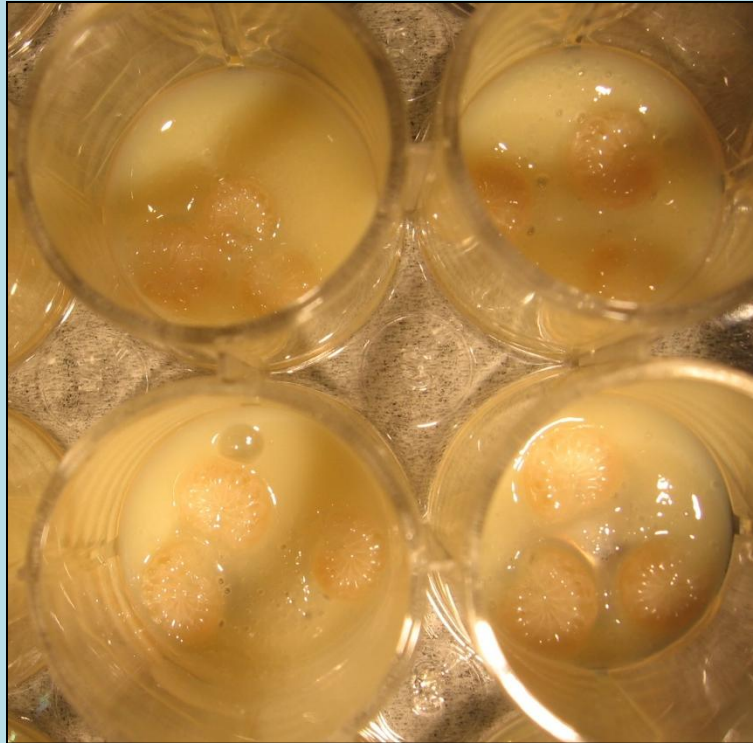
GFP= Green Fluorescent Protein

Rearing worker honey bees in lab

1 day old larvae



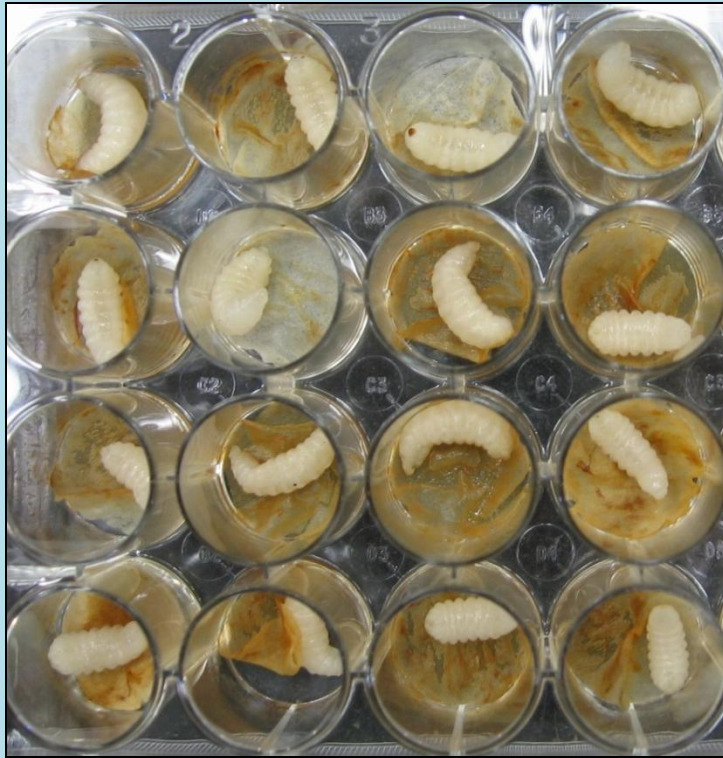
3 day old larvae



5 day old larvae



Pre-pupae



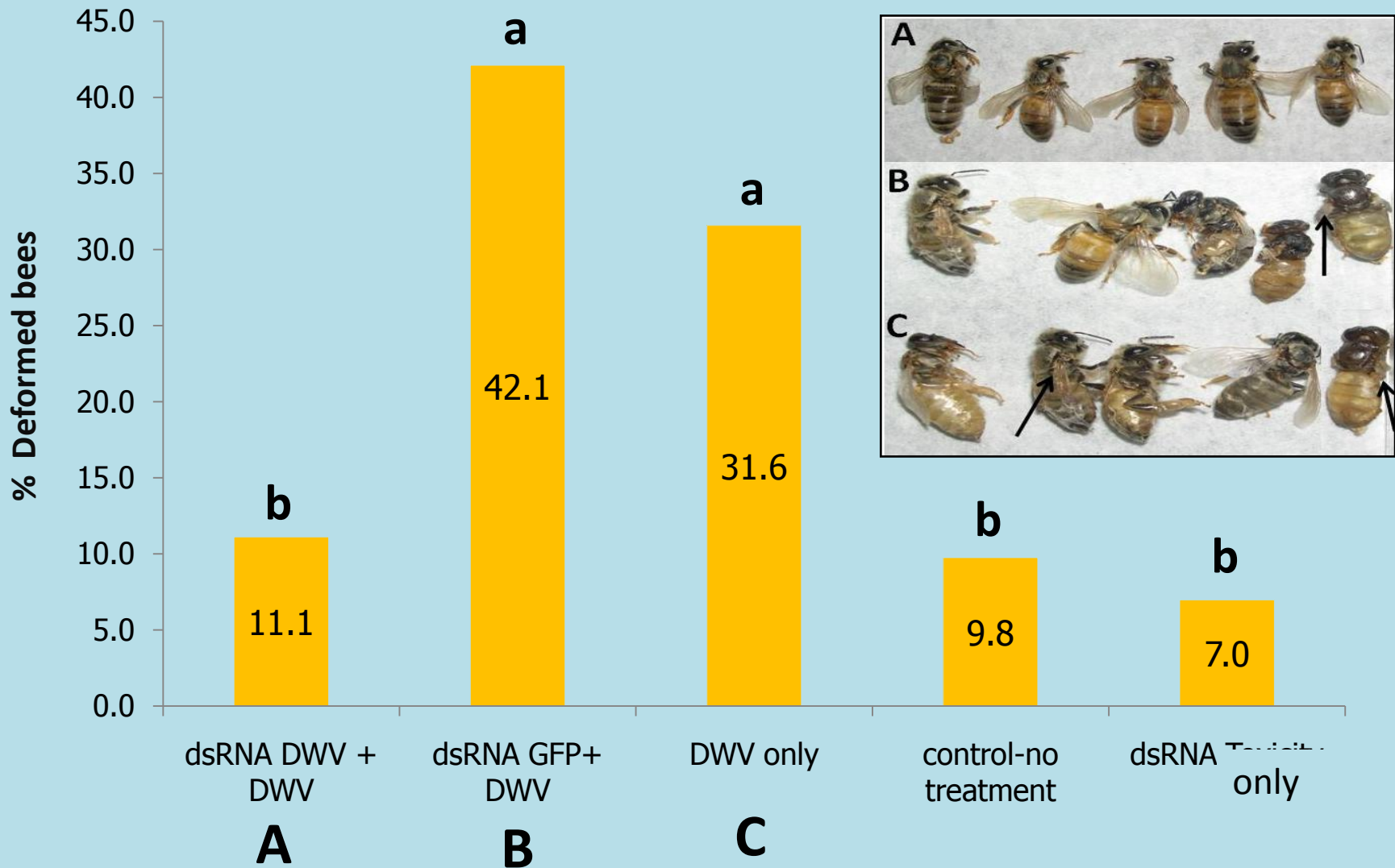
Pupae



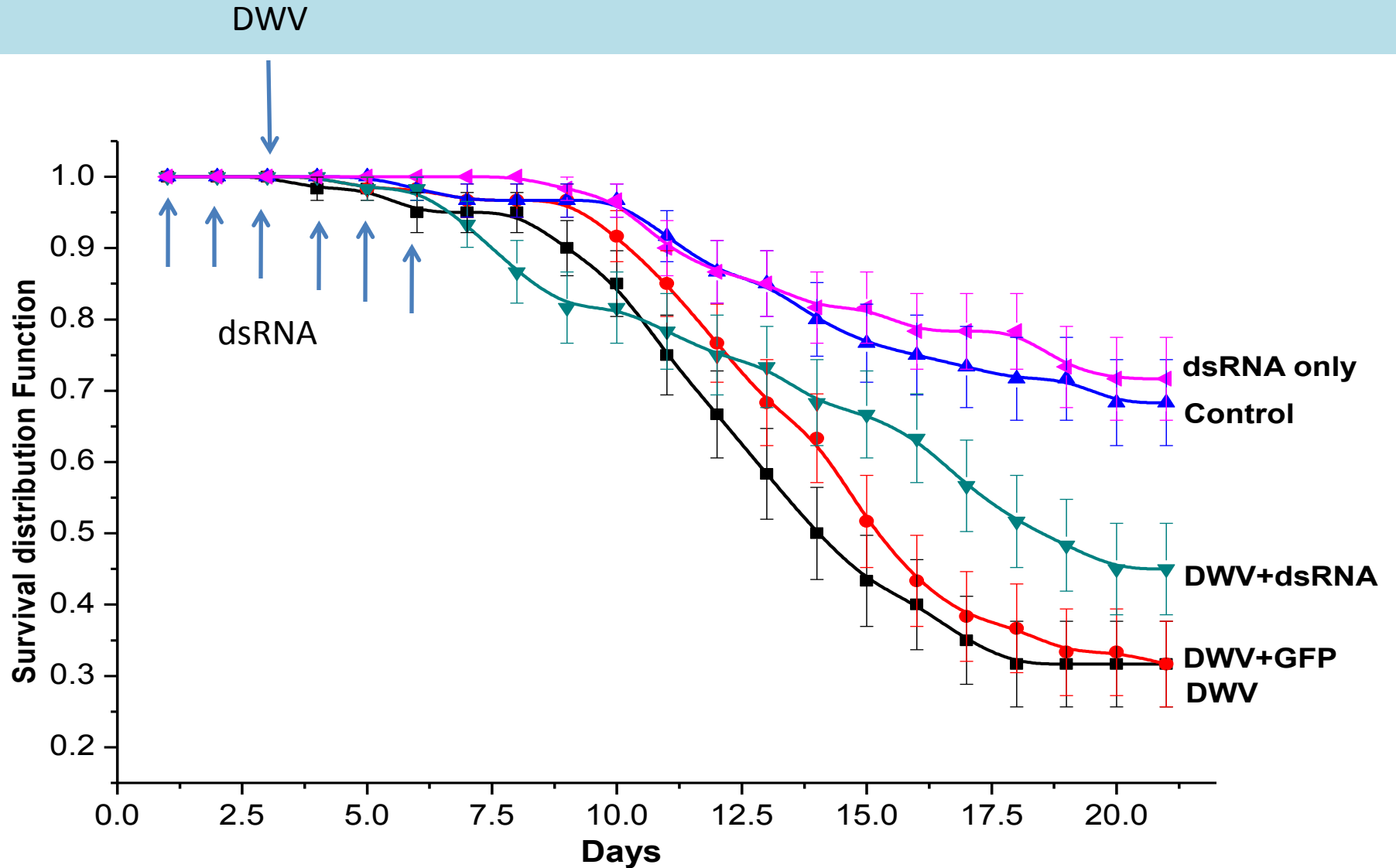
Adult bee emerged



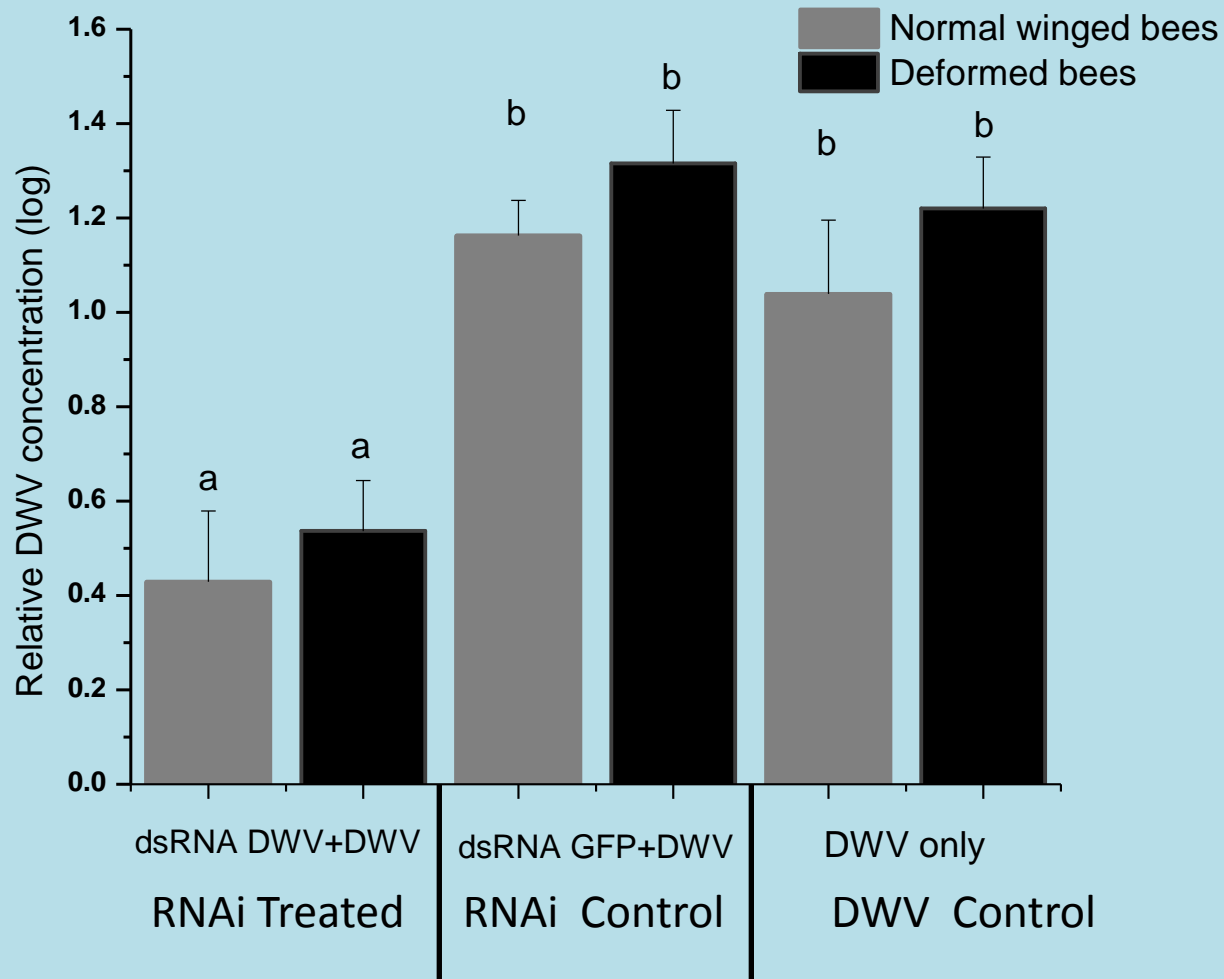
Effect of dsRNA on wing deformity



Effect of dsRNA on survival in DWV infected larvae



Relative DWV concentration (Larvae)

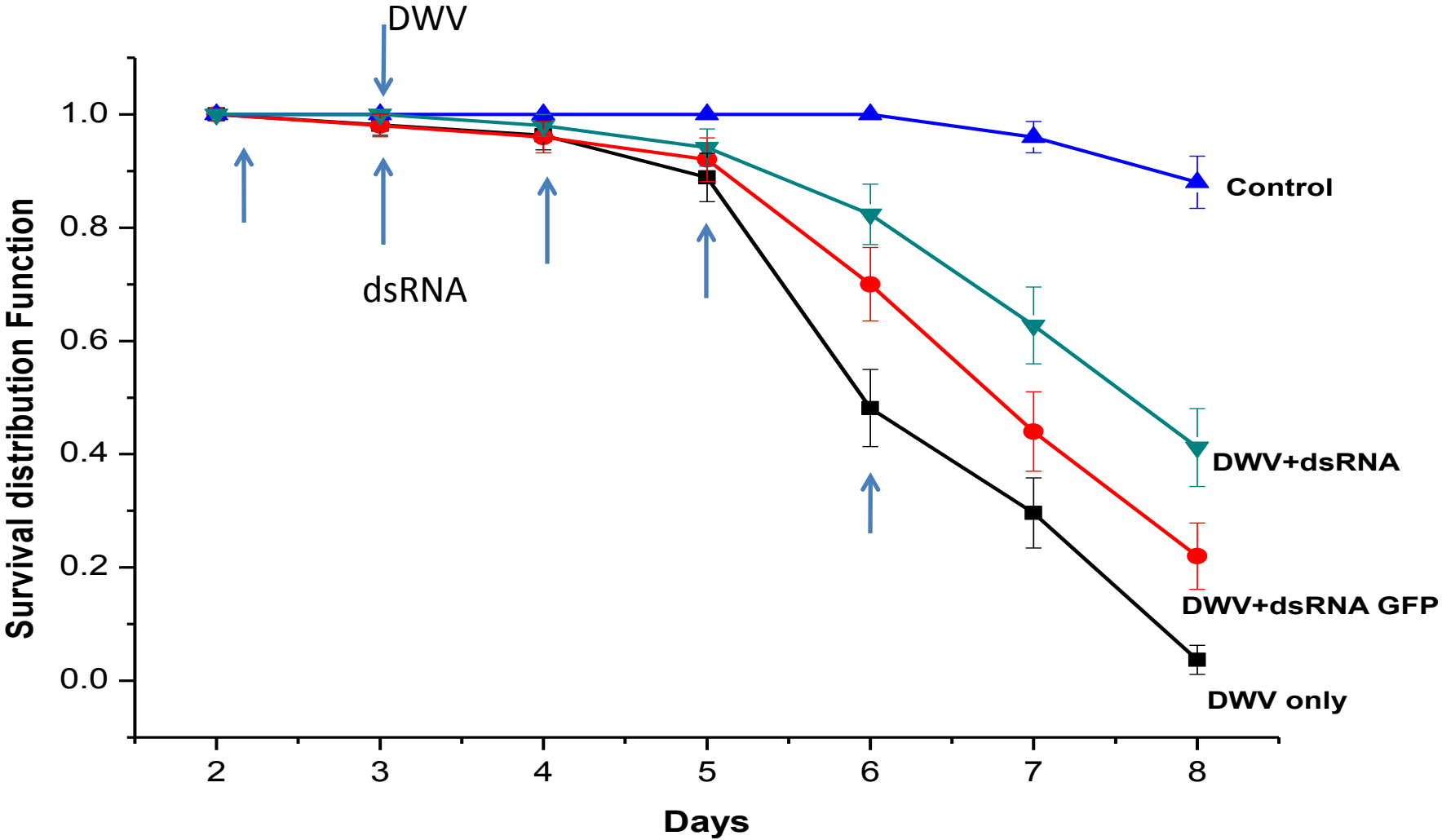


Adult bee experiment

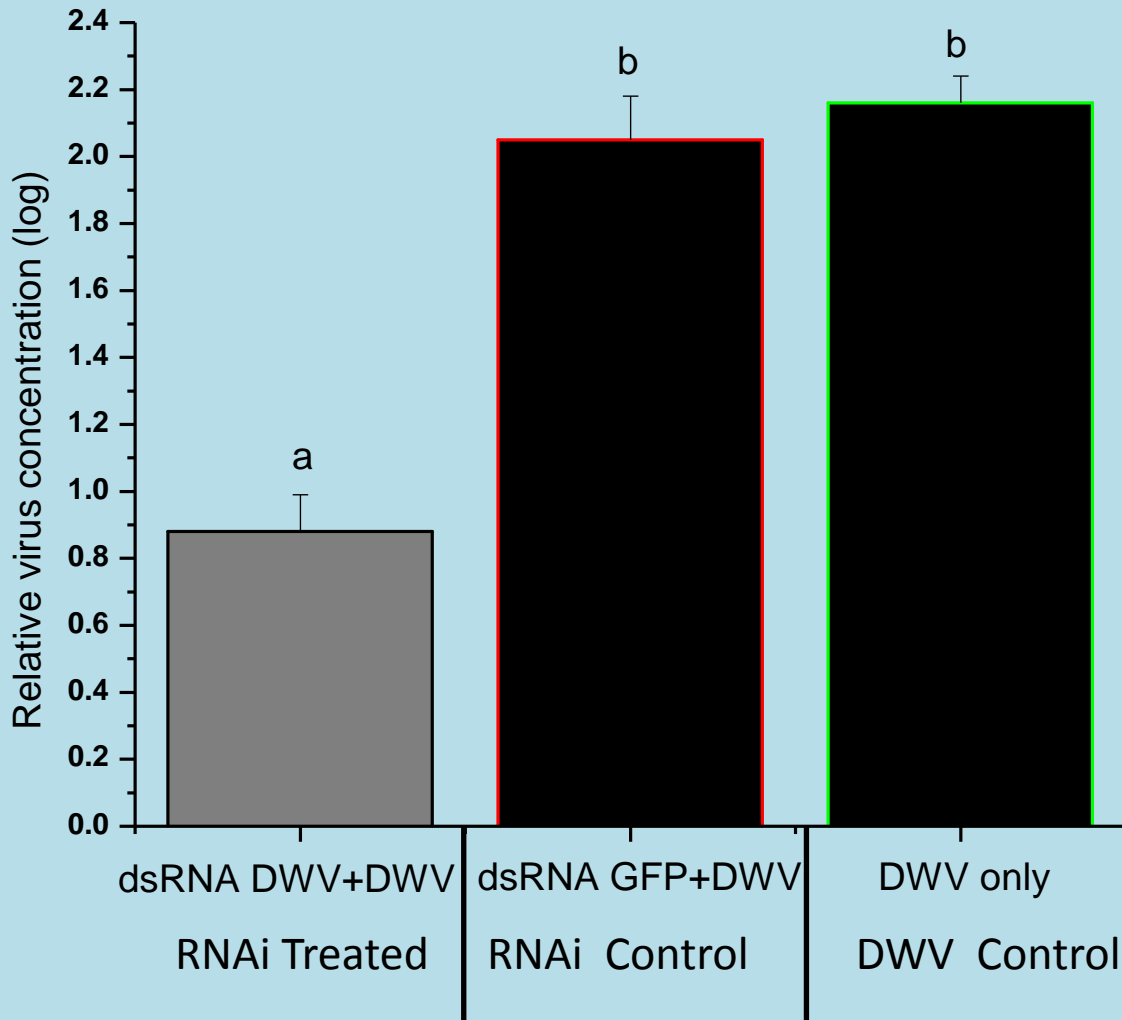
- 50 bees/treatment
 - 1 μ g dsRNA/bee
 - Sugar syrup and water
 - Dead bees collected daily
- 4 Treatments
 - T 1. dsRNA DWV+DWV
 - T 2. dsRNA GFP+DWV
 - T 3. DWV only
 - T 4. Control-no treatment



Effect of dsRNA on survival in DWV infected adult bees



Relative DWV concentration (Adult bees)



Conclusion

dsRNA against DWV:

- Suppresses viral replication
- Marginal increases in larval survival
- Reduces wing deformity
- Increases longevity of adults
- Is not toxic

Acknowledgments

- Rob Currie
- Rob Hill
- Steve Whyard
- Judy Chen
- Joachim de Miranda
- Young-Jae Eu
- Nitzan Paldi
- Rheal Lafreniere
- David Ostermann
- Santosh Kumar
- Doug Durnin
- Amanda Van Haga
- Manitoba beekeepers

Funding

NSERC-CANPOLIN

Canadian Bee Research Fund

Manitoba Beekeepers Association,

Saskatchewan Beekeepers

Association, NSERC, ARDI, UMGF,

ACAFF,



Thank you