



# Examining possible bioaccumulation of dsRNA insecticides

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## Background

- Pests influence the yield of agricultural plants and transmit diseases onto plants
- Conventional pesticides kill various non-target species
- RNA interference (RNAi) technology can be used to develop RNAi-based pesticides (**species-specific**)
- RNAi can silence genes by introducing double-stranded RNA (dsRNA) into the organisms' cell

## Methods

Subjects:

- One of the most common plant pests: aphids
- The primary aphid predator: ladybird beetles
- dsRNA targeting genes: *ApCP19* and *ApVhal26*

Procedure:

- dsRNA => aphids => ladybird beetles
- Feed dsRNA-enriched diet to aphids, then feed those aphids to ladybird beetles
- Observe the survivorship of two species; use quantitative real-time PCR (qRT-PCR) to evaluate the gene expression

## Objective

To test if dsRNA bioaccumulates in predaceous insects that consume herbivorous insects that feed on a dsRNA-enriched diet.

## Hypothesis

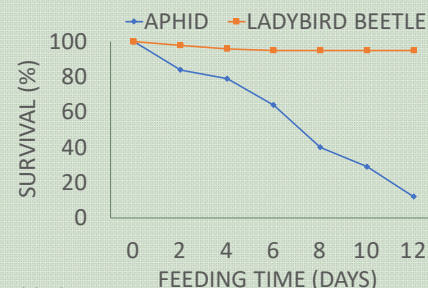
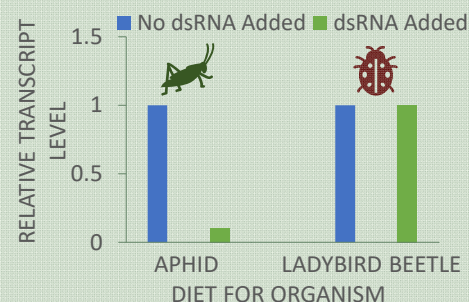
H: No dsRNA will be found in ladybird beetles that consume aphids that were fed a dsRNA-enriched diet.

P: The survivorship of aphids would reduce, but ladybird beetles would not be affected; target gene would only be silenced in aphids.

## Expected results

Agreed with the prediction:

Reduced survivorship of aphids.  
No longevity or fecundity impacts on ladybird beetles.



Knockdown of the target gene (both for *ApCP19* and *ApVhal26*) in the aphids.  
No knockdown of the homologous gene in ladybird beetles.

## Conclusions

- Applying aphid-specific dsRNA should control aphids effectively, but not harm ladybird beetles that consume aphids
- Future studies could test the bioaccumulation of other dsRNA (target different gene), or if dsRNA (target gene *ApCP19* or *ApVhal26*) would accumulate in other aphid predator species

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## References

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