Geographic variation in *Wolbachia*-induced cytoplasmic incompatibility in the fly *Drosophila recens*

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**Introduction**

*Wolbachia* are bacterial parasites that commonly infect arthropods. This parasite is capable of causing many deleterious effects on the progeny of fruit flies that are infected, including cytoplasmic incompatibility.

Cytoplasmic incompatibility occurs when *Wolbachia*-infected males mate with *Wolbachia*-uninfected females. The parasite causes the sperm and egg to be unable to yield viable offspring. Although some offspring are still able to emerge, the percent of healthy larvae produced typically decreases when the paternal parent is infected with *Wolbachia*.

*Drosophila recens* is a type of fruit fly that is commonly infected with *Wolbachia*. In the laboratory, these flies can be healed of the parasitic infection using tetracycline.

**Materials and Methods**

1. Virgin, infected males were collected from different strains originating from three locations (Canada, New York, and Great Smoky Mountains) and virgin uninfected females were collected.
2. After aging for 7-10 days, a male and female were placed together in individual vials and observed for copulation.
3. Females were then moved onto mushroom-agar food while the males were set aside for DNA extraction and PCR.
4. Hatched eggs and unhatched eggs were counted over the next 72 hours to measure cytoplasmic incompatibility.
5. The percentage of cytoplasmic incompatibility from the three locations was compared to the control.

**Results**

- Overall low hatch rate
- Significant variation* between control and experimental hatch rates
- Consistent hatch rate between locations
- Low levels of CI compared to other studies
- Significant variation* between strain locations for egg production

\begin{table}[h]
\begin{tabular}{|c|c|c|c|c|}
\hline
Source & Nparm & DF & Sum of Squares & F Ratio & \textit{Prob} \textgreater \ F \\
\hline
Strain within Strain Location & 5 & 5 & .3376981 & 1.2324 & 0.2983 \\
Strain Location within Control vs. Experimental & 2 & 2 & .0463964 & 423.3 & 0.8559 \\
Control vs. Experimental & 1 & 1 & .4477621 & 3.1710 & 0.0050* \\
\hline
\end{tabular}
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**Objective**

The objective of this research was to compare levels of cytoplasmic incompatibility from three different locations across North America. These three locations are Calgary, Alberta; Fern Lake, New York; and the Great Smoky Mountains.

**Conclusion**

The low hatch rate in each of the strains would have a detrimental long-term effect on the species of fly.

The higher hatch rate in the control when compared to the experimental shows that the presence of *Wolbachia* is decreasing the fecundity of the fly.

Consistent hatch rates between the geographic locations tested shows that the presence of *Wolbachia* is affecting the flies similarly despite the environment they are in.

In reference to previous work, the percentage of cytoplasmic incompatibility found in this study is low, at about 72%. This lower amount of CI may demonstrate that the effect of *Wolbachia* is not as deleterious as previously determined. It could also show that for CI is not effecting this species as much as others.

**Literature Cited**


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