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# Comparing life history traits of potential thrips vectors of Soybean Vein Necrosis Virus and the effect of virus infection on thrips vectors

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### Introduction

#### Soybean Vein Necrosis Virus (SVNV)

- New Tospoviral disease discovered in Tennessee in 2008 [1,2].
- Symptoms begin as yellowing, or chlorosis, along the veins of the leaf (Fig. 1A) [3].
- Over time, lesions become brown and leaf tissue dies (Fig. 1B) [3].
- SVNV has spread to 16 other states and has been detected in Ontario, Canada [3].

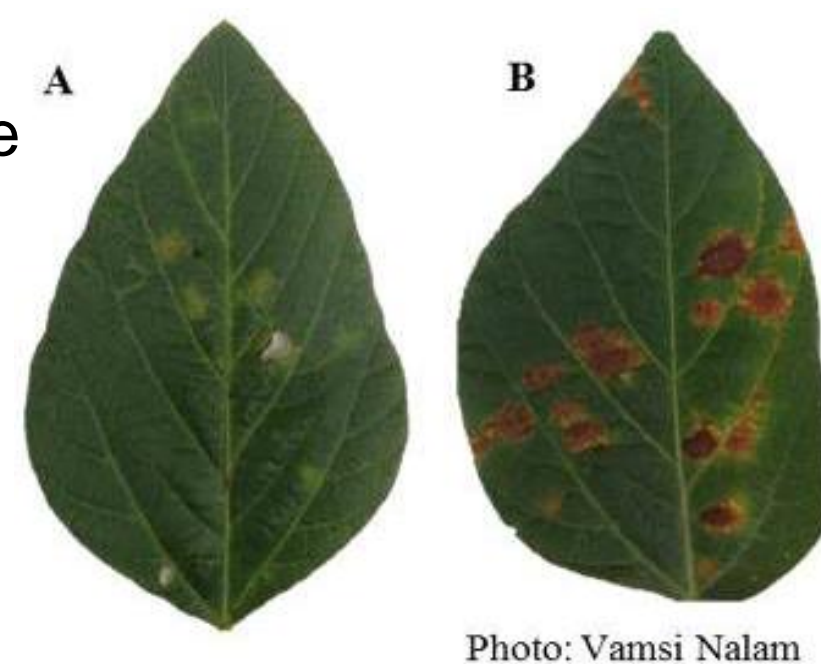


Fig. 1. SVNV symptoms

#### Thrips vectors

- *Tospoviruses* are transmitted by up to 14 different species of thrips [4].
- Soybean thrips have been confirmed to be vectors of SVNV (Fig. 2) [4].
- Other species present in soybean fields include eastern flower thrips, western flower thrips, and tobacco thrips [5].



Fig. 2. Soybean thrips

### Objectives

1. To determine the effect of SVNV on its insect vector, soybean thrips.
2. To compare life history traits of soybean thrips, to a potential vector species, eastern flower thrips.

### Results

#### Detection of SVNV in soybean thrips using RT-PCR

- RNA extracted from individual thrips was used for cDNA synthesis.
- Reverse-transcriptase-Polymerase Chain Reaction (RT-PCR) was performed to detect the presence of SVNV in individual soybean thrips.

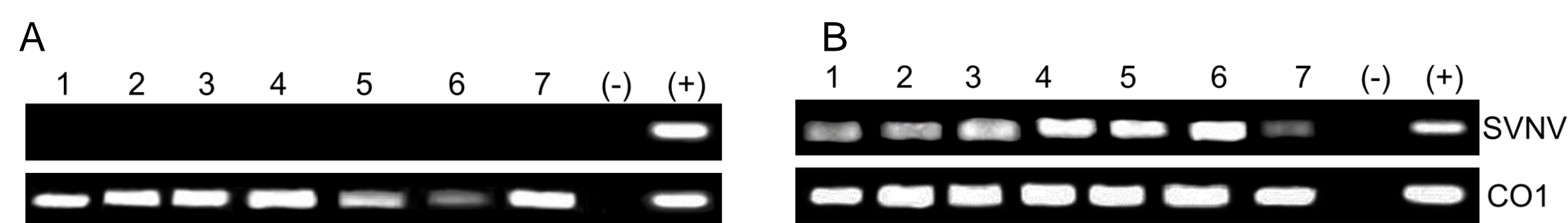


Fig. 3. An example of a RT-PCR gel image showing presence or absence of SVNV in individual thrips A) uninfected soybean thrips and B) SVNV infected soybean thrips. CO1 refers to Cytochrome oxidase 1 gene which was used as the house-keeping gene. SVNV nucleocapsid protein gene was used to detect SVNV.

### Results (Cont.)

#### Effect of SVNV on soybean thrips life history traits

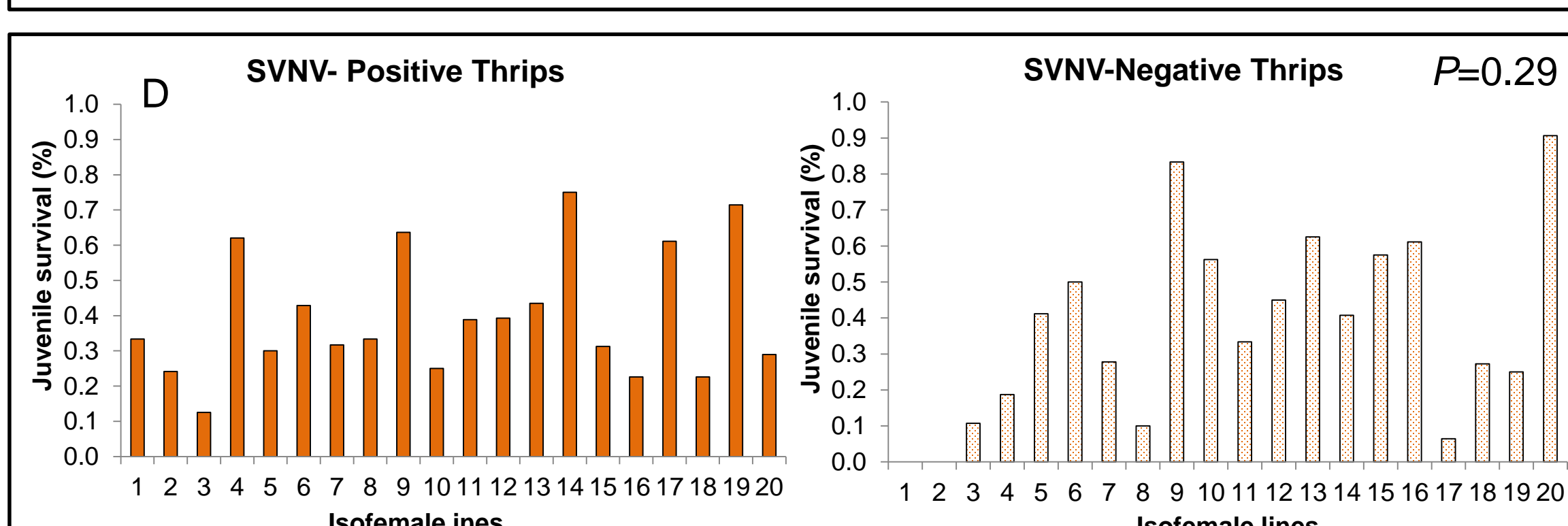
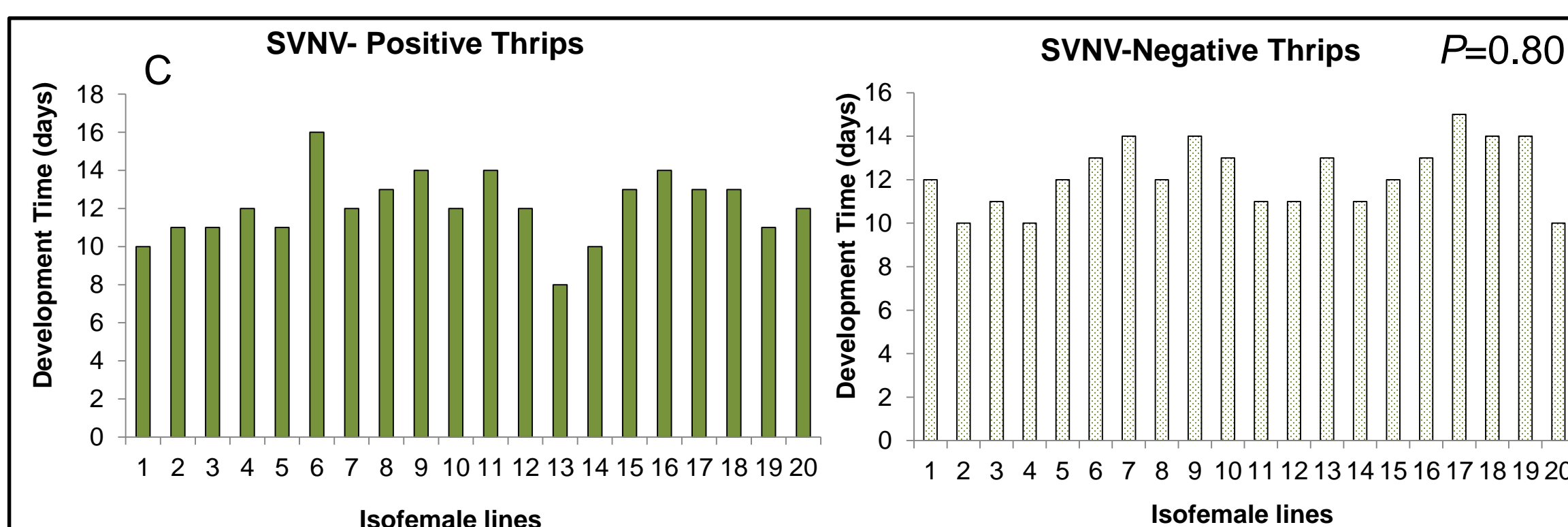
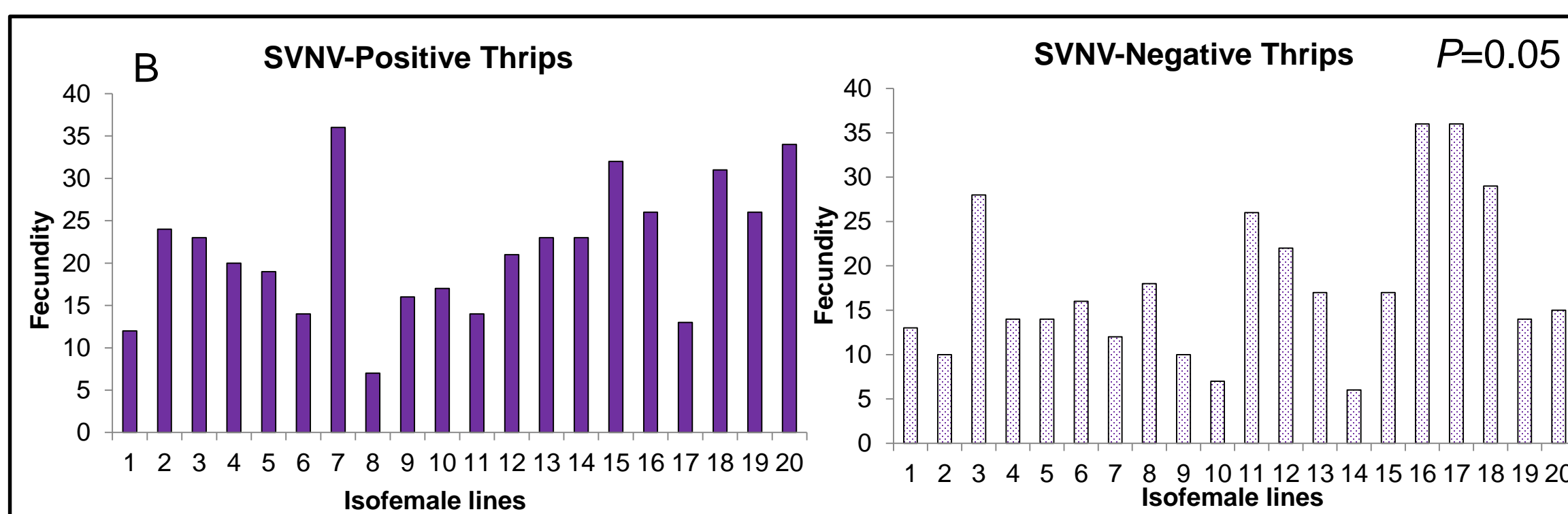
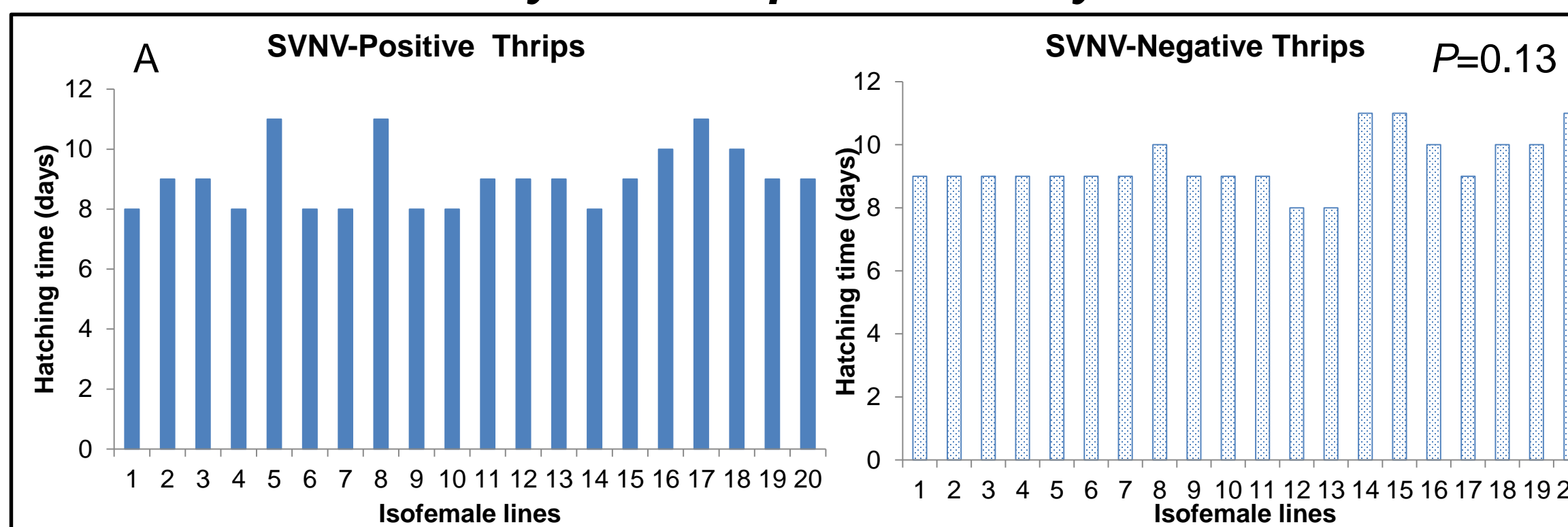


Fig. 4. Life history traits, including A) hatching time, B) fecundity, C) development time and D) juvenile survival of SVNV-positive and negative isofemale line thrips on soybean plants. Kruskal-Wallis non-parametric test was performed using Minitab Version 16 (Minitab® Stat College, PA).

### Results (Cont.)

#### Comparison between soybean thrips and eastern flower thrips

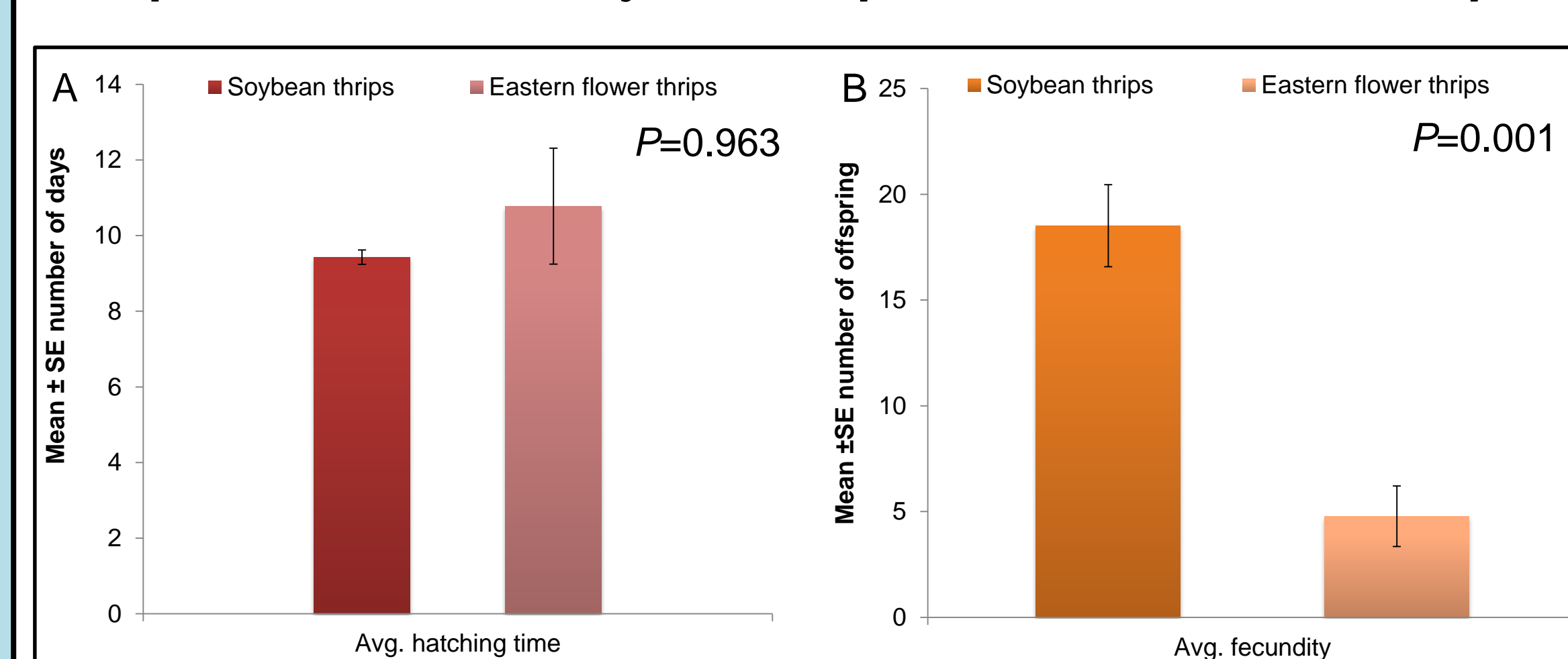


Fig. 5. Life history traits, including A) average hatching time and B) average fecundity for soybean thrips and eastern flower thrips. Kruskal-Wallis non-parametric test was performed using Minitab Version 16 (Minitab® Stat College, PA).

### Conclusions

- Reverse-transcriptase-Polymerase Chain Reaction (RT-PCR) confirmed the presence or absence of SVNV in thrips species (Fig. 3).
- Overall, SVNV did not affect soybean thrips fitness on soybean plants (Fig. 4).
- However, there was a significant difference in the fecundity of SVNV-positive soybean thrips compared SVNV-negative thrips, which is an important life history trait since the next generation will be affected (Fig 4 B).
- There was no difference between soybean thrips and eastern flower thrips in hatching time (Fig. 5A).
- Eastern flower thrips fecundity was significantly lower compared to soybean thrips on soybean plants (Fig. 5B).
- Results of our research will help in developing specific management strategies for SVNV based on insect vector biology.

### References

1. Tzanetakis (2009). *Phytopathology* 99: S131.
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3. Bloomingdale, et al (2014). *Soybean Disease Management*. 1-8.
4. Zhou and Tzanetakis (2013). *Phytopathology* 103: 966-971.
5. Irwin, Yeargan, and Marston (1979). *Environmental Entomology* 8: 131-140.

### Acknowledgements

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