

# Functional Response of Convergent Lady Beetle, *Hippodamia convergens* Guérin-Ménéville (Coleoptera: Coccinellidae) Under Simulated Winter High Tunnel Conditions

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## Background

- High tunnels are an important method of season extension in New England

- Growers often struggle with destructive aphid (*Myzus persicae*) outbreaks in high tunnels over the winter growing season

- Environmental factors in high tunnels are different from outdoor growing environments and are highly conducive to aphid outbreaks on overwintered crops



Fig. 1 *Myzus persicae*, green peach aphid

- Aphid outbreaks are commonly managed with a number of strategies including the timed release of beneficial insects



Fig 2. *Hippodamia convergens*, lady beetle

**The goal of this experiment was to examine the effects of simulated winter tunnel conditions on beneficial insects, particularly *Hippodamia convergens* (Lady Beetle).**

## Methods

- Predators were treated according to treatment group prior to being released into arena: room temperature for 24 h (RM), in ice for 24 h (I), or in a freezer for 15 min (FR)
- After chill coma recovery test, predators were released into bioassay arenas (Fig. 3)
- The number of aphids was counted and record before and after the predator's 24-hour feeding period
- All data analyses were conducted using JMP (SAS Inst.; Cary, NC)



Fig. 3 Bioassay arena

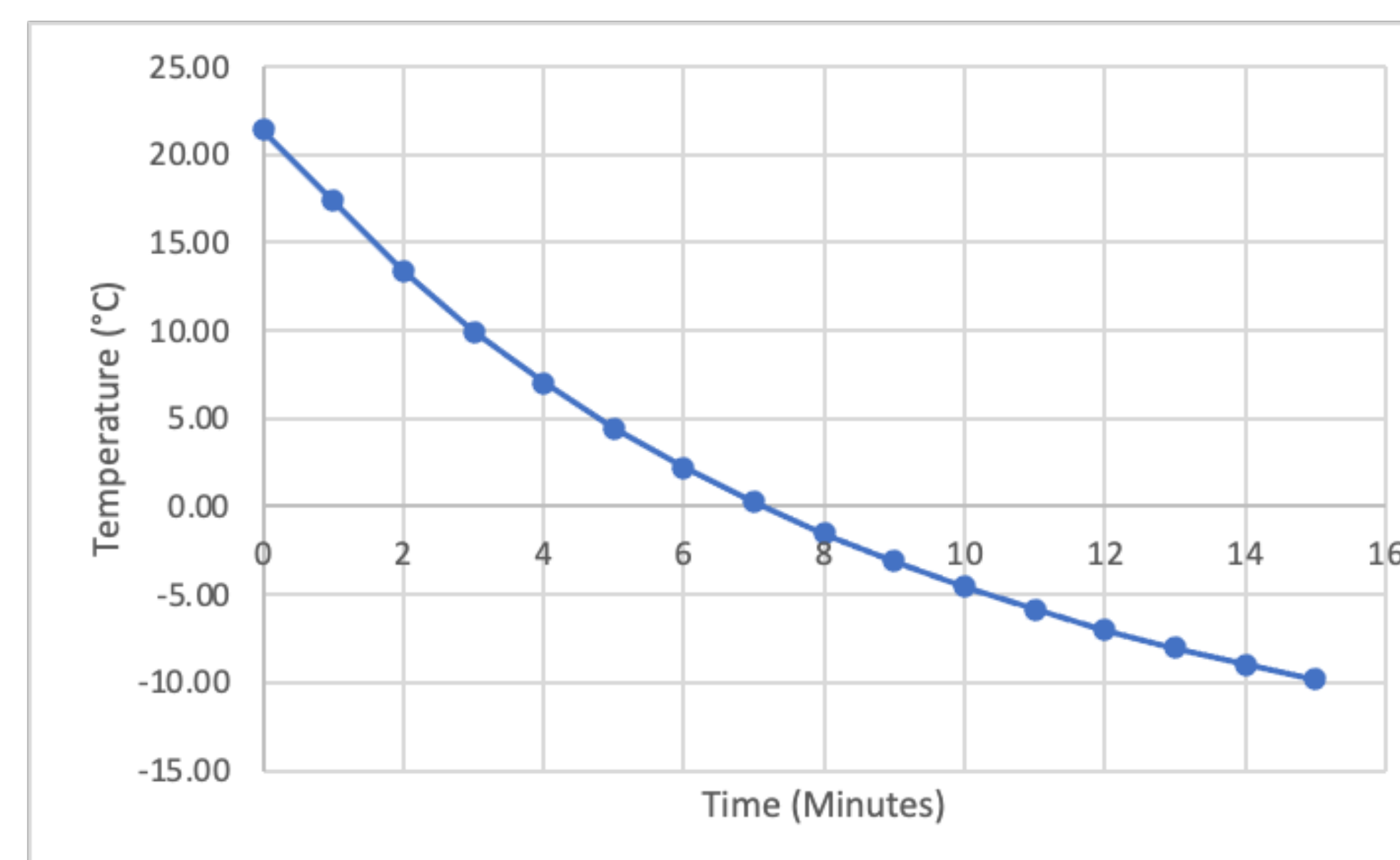


Fig 4. fifteen minute predator freezer treatment temperature data recorded in degrees Celsius

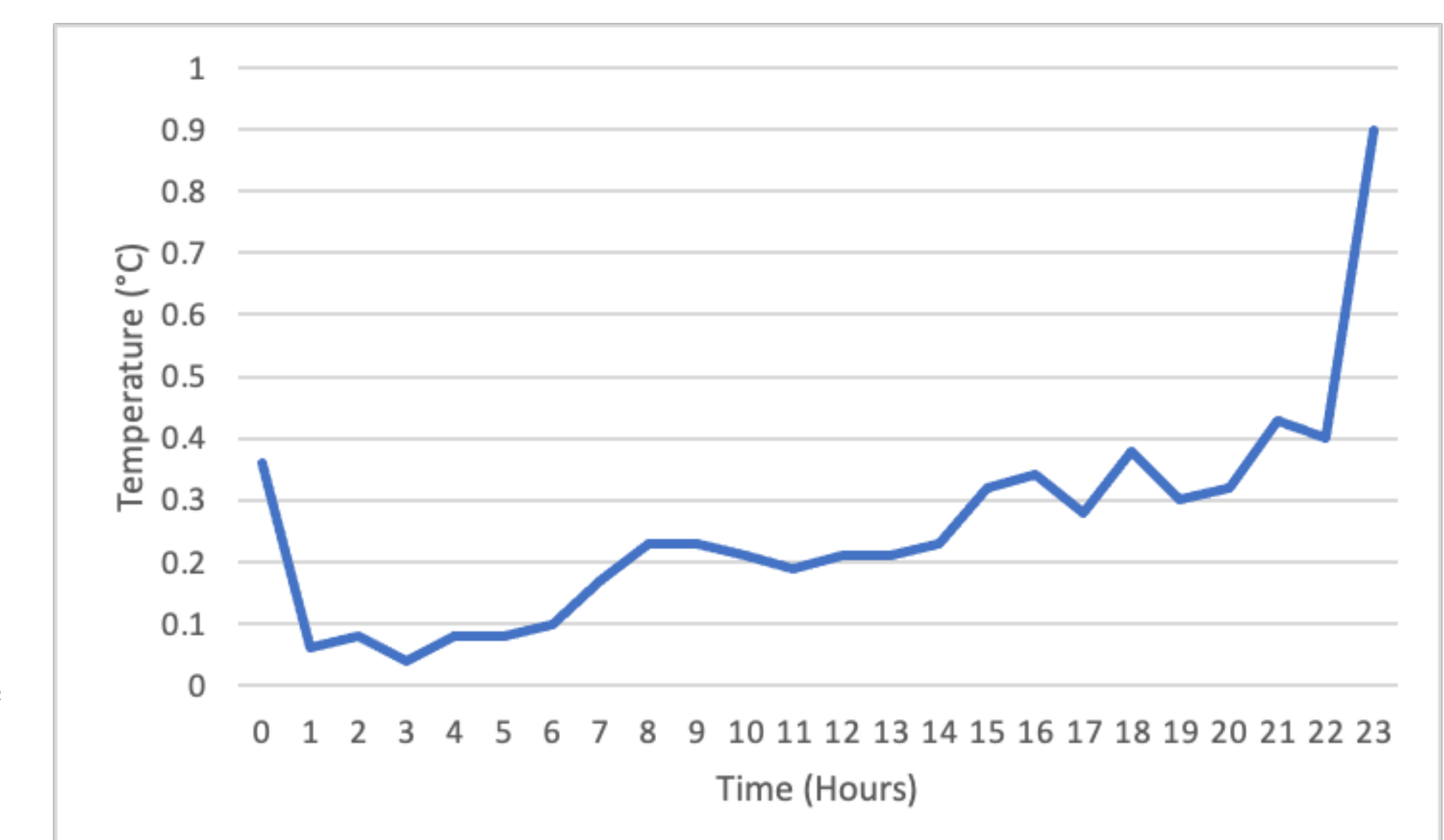


Fig 5. Twenty four hour predator ice treatment temperature data recorded in Celsius

## Results

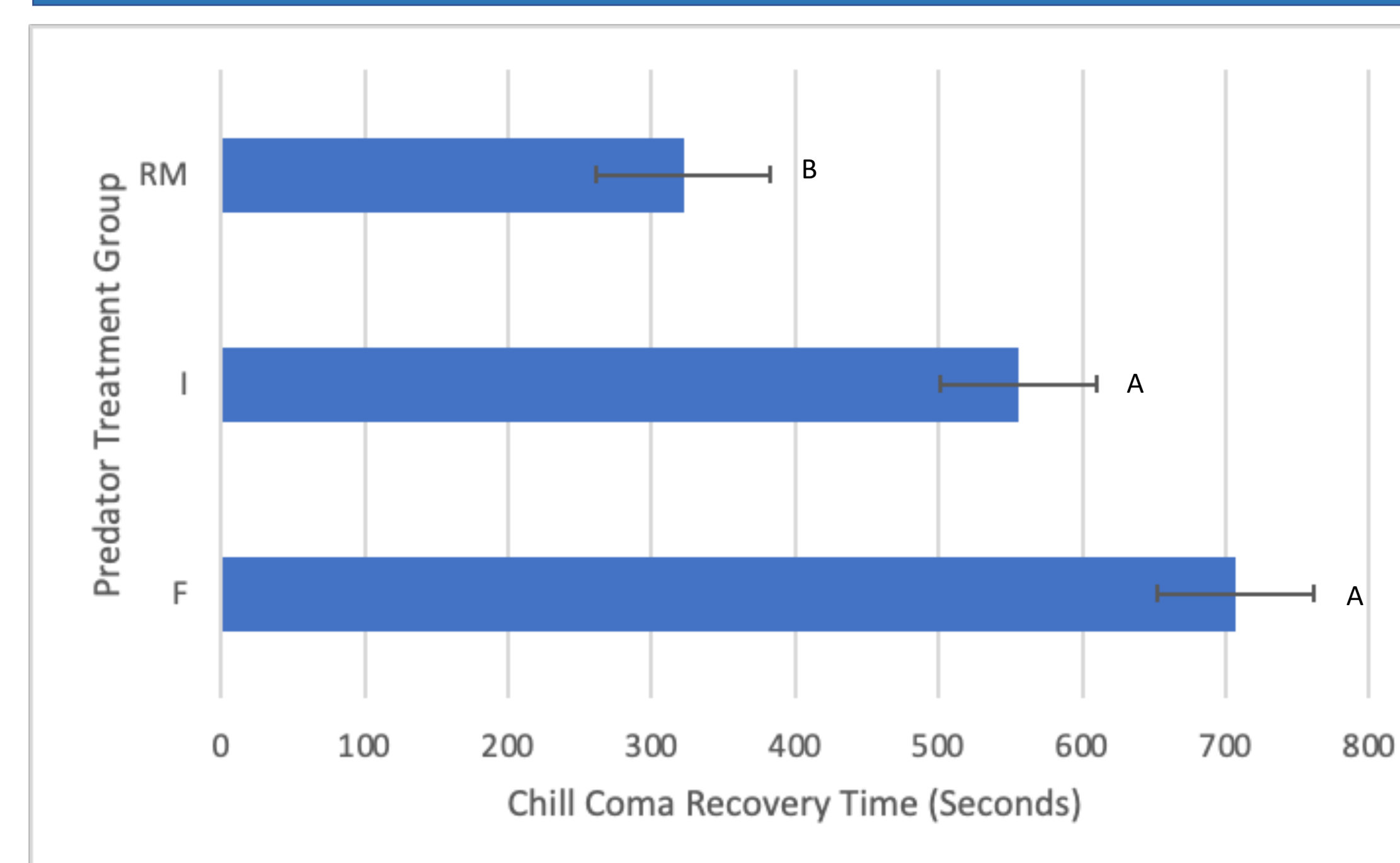


Fig. 5 Mean ( $\pm$ SEM) chill coma recovery time recorded in seconds within a twenty minute window. Bars with the same letter are not significantly different according to ANOVA followed by Tukey's HSD ( $\alpha = 0.05$ )

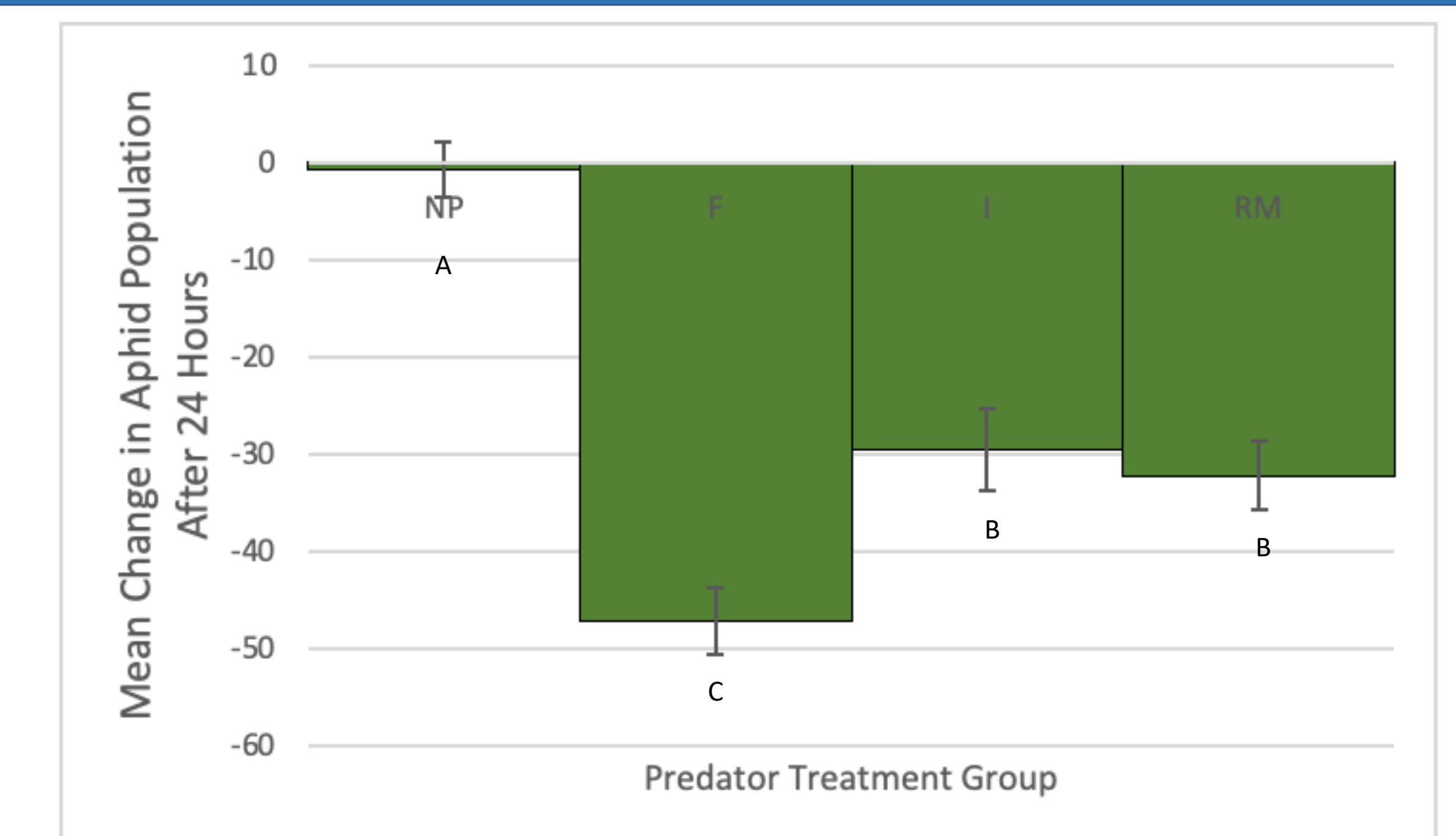


Fig. 6 Mean ( $\pm$ SEM) change in aphids per treatment group after being predated on for twenty four hours. Bars with the same letter are not significantly different according to ANOVA followed by Tukey's HSD ( $\alpha = 0.05$ )

- ❖ Lady beetles that were frozen (FR treatment group) for fifteen minutes predated upon more aphids on average than those who were subjected to the ice or room temperature treatments
- ❖ We are not sure why this is, though it may be a method of amassing protein to rebuild tissues damaged by freezing temperatures
- ❖ These treatments were similar to winter high tunnel conditions and did not negatively impact lady beetle predation

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