

# Difference in leaf trichome density is ineffective against the feeding of later instar caterpillars

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## BACKGROUND

- Plants being immobile, are continuously under the attack by insect herbivores
- To tackle this, there are the first line of defenses owned by plants which comprise spines, thorns, trichomes and plant waxes.
- Trichomes are hair like protuberances on various parts of plants which deter herbivore feeding and oviposition and rendering it exposed to predators for more time
- The trichomes are divided into glandular and non-glandular depending upon whether or not they secrete chemicals or not
- Non glandular provide defense by deterring herbivore movement, feeding or oviposition
- And the glandular ones physically entrap herbivores into their sticky exudates or by production of volatile compounds
- In this study we wanted to know if trichomes can affect the feeding of later instar caterpillars

## OBJECTIVES

- To determine the trichome density of different tomato varieties
- To study and compare the time taken by third instar caterpillars to initiate feeding on tomato varieties which differ in their trichome density

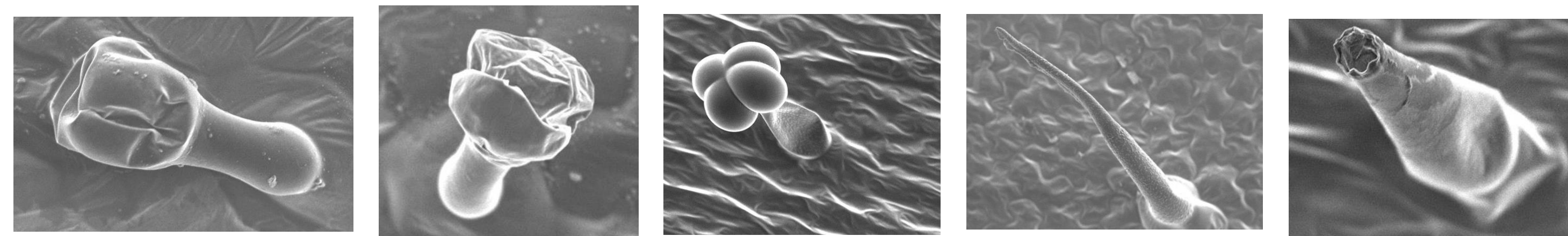


Figure 1 Pictures taken from DSEM of different types of trichomes of tomato at 500 – 1500x magnifications

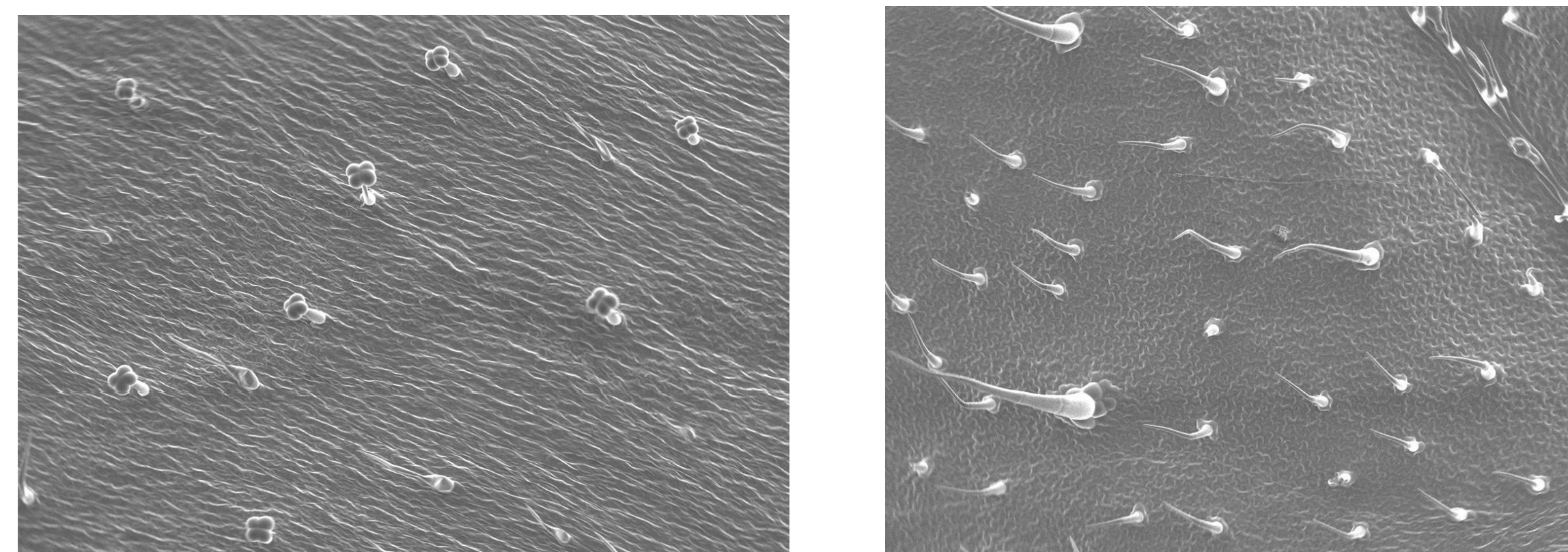


Figure 2 Comparison of trichomes of variety Big beef v/s supersweet at 100x magnification

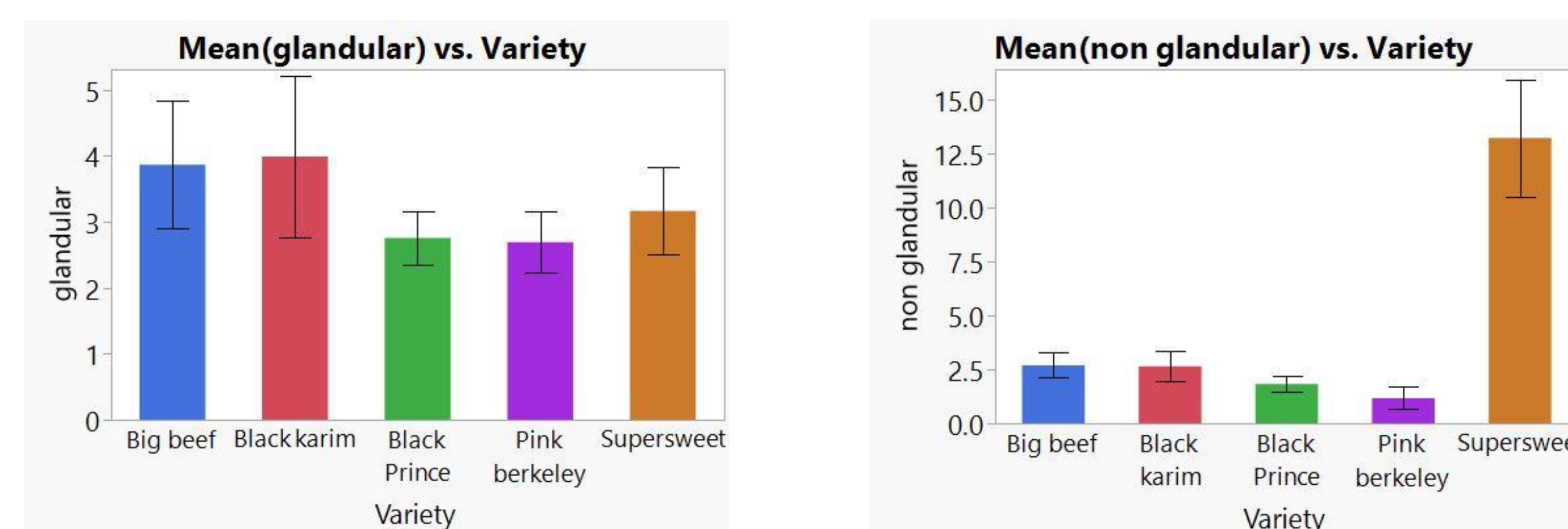


Figure 5 Graph showing comparison of glandular and non- glandular trichomes of different tomato varieties

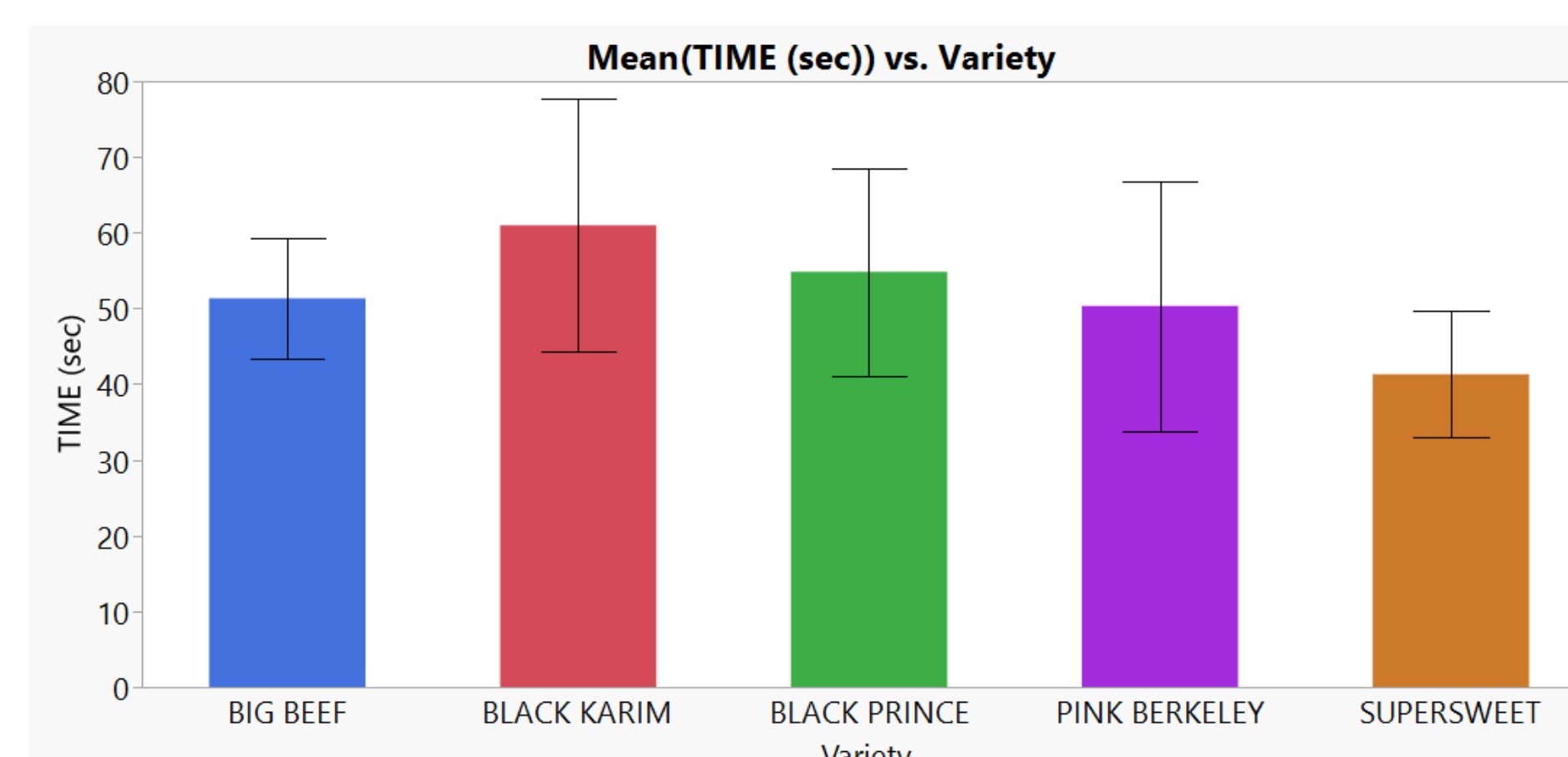


Figure 6 Graph showing comparison of time taken by third instar caterpillars to commence feeding on tomato varieties

## RESULTS

- The trichome density of these varieties are significantly different from each other
- Except the supersweet variety (a greater number of non-glandular trichomes), all other varieties have more glandular trichomes as compared to the non-glandular the ones
- The time taken to initiate feeding of the third instar caterpillars doesn't differ according to different varieties



Figure 3 *Manduca sexta* feeding on Supersweet variety



Figure 4 tomato plants

## MATERIALS AND METHODS

- Five varieties of tomatoes were used for this experiment
- For determining the trichome density, we did Desktop scanning electron microscopy of 3 plants per variety (3 leaf samples per plant)
- The trichome count was done on consistent 100x magnification Trichome density (1 mm<sup>2</sup> = trichome count at 100x magnification/1.89) where, 1.89 mm<sup>2</sup> is the leaf area at 100x magnification
- For next step of this experiment for determining the time taken by caterpillars to initiate feeding, we used *Manduca sexta* which is a *Solanum* specialist herbivore
- Six third instar caterpillars were fed on six separate plants each variety and the time between placement of caterpillar on the plant and the initiation of feeding was recorded for one caterpillar at a time by using stopwatch
- We ran a non-parametric one-way ANOVA to compare the feeding initiation time of caterpillars on different varieties
- The data was analyzed through one way Anova test in JMP

## CONCLUSIONS

- Caterpillar feeding was compared between five different tomato varieties, which differ in their non glandular trichomes density
- However, we found that there is very less difference in time the later instar caterpillars took to commence feeding on these varieties
- This suggests that the glandular as well as non-glandular trichomes are less effective in preventing caterpillar herbivory for late- instar caterpillars
- So, the role of trichomes in defense against later instar caterpillars lies in affecting and puncturing their gut peritrophic membrane after they start feeding on plants

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