

The Number of Queens in Red Imported Fire Ant Colonies and Texas Horned Lizard Density

Jeff Garvey & Dean Williams
Department of Biology, Texas Christian University



INTRODUCTION

- Texas Horned Lizards are egg-laying reptiles who specialize on harvester ants for their diet
- Texas Horned Lizards have declined or disappeared in many parts of Texas
- Red Imported Fire Ants (RIFA) have been shown to have negative effects on harvester ants and hatchlings of Texas Horned Lizards
 - RIFA are native to South America, extremely aggressive, and lack competitors in the United States
- RIFA colonies exist in two forms: monogyne (single queen) and polygyne (multiple queen)
 - Polygyne colonies are 3-4x as dense as monogyne colonies
- Two small towns called Kennedy and Karnes City have populations of Texas Horned Lizards, harvester ants, and RIFA coexisting
- Our hypothesis is that Texas Horned Lizards will have lower densities near polygyne colonies compared to monogyne colonies or that RIFA colonies will be predominately monogyne in these towns because horned lizards are present



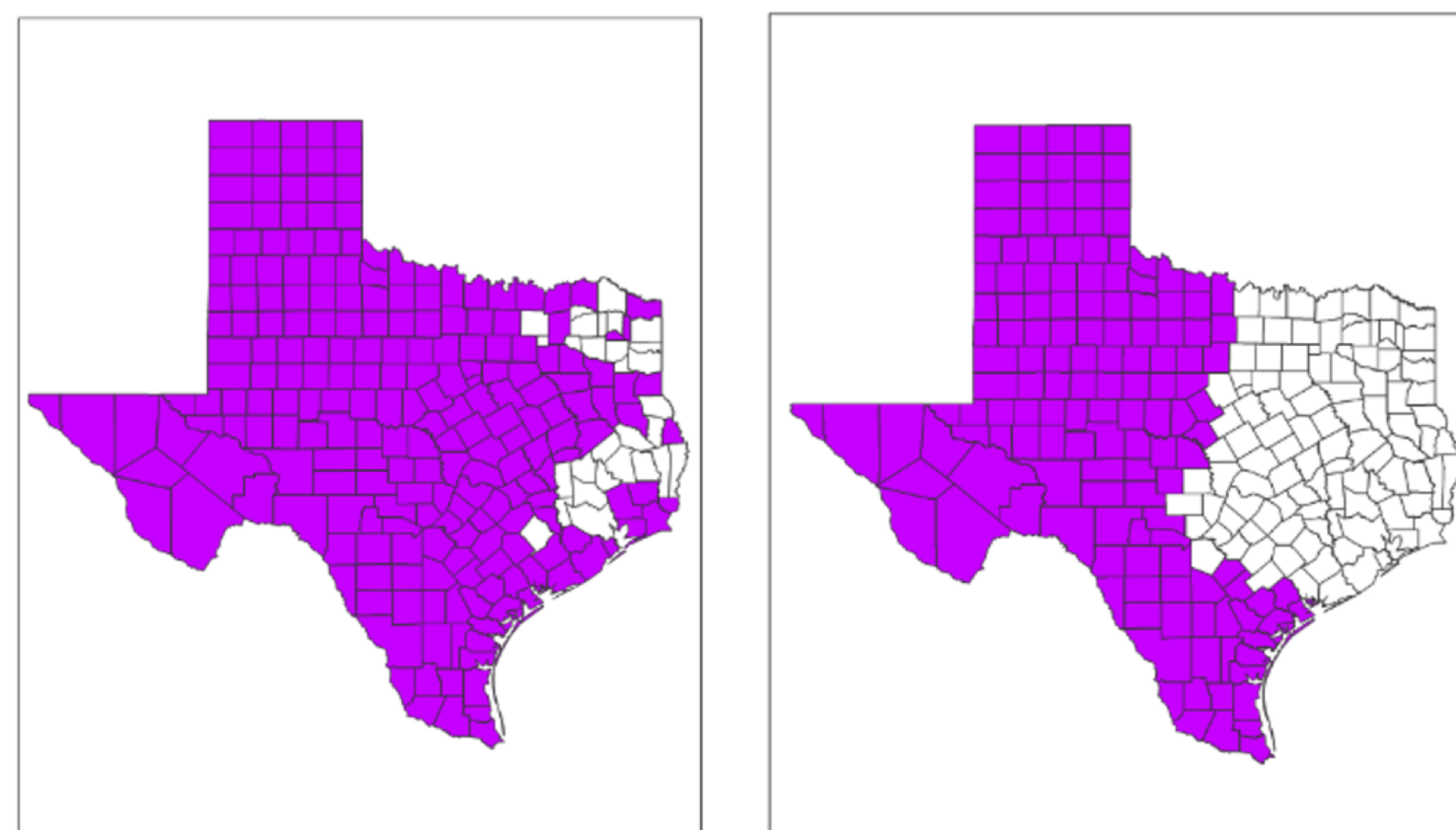
Texas horned lizard



Red imported fire ant



Karnes County, containing Karnes City and Kenedy



Texas counties with Texas Horned Lizards present in the 1960s (left) versus now (right)

METHODS

- We collected 30 putative RIFA samples from 8 sites in Karnes City and Kenedy
- We obtained average Texas Horned Lizard densities in those 8 sites
- We extracted the ant DNA and sequenced it via an ABI 3130XL Genetic Analyzer
- Ant sequences were then compared to RIFA sequences in Gen Bank to determine similarity
- We conducted gel electrophoresis with confirmed RIFA samples to amplify Gp-9 B and b alleles (Fig. 1)

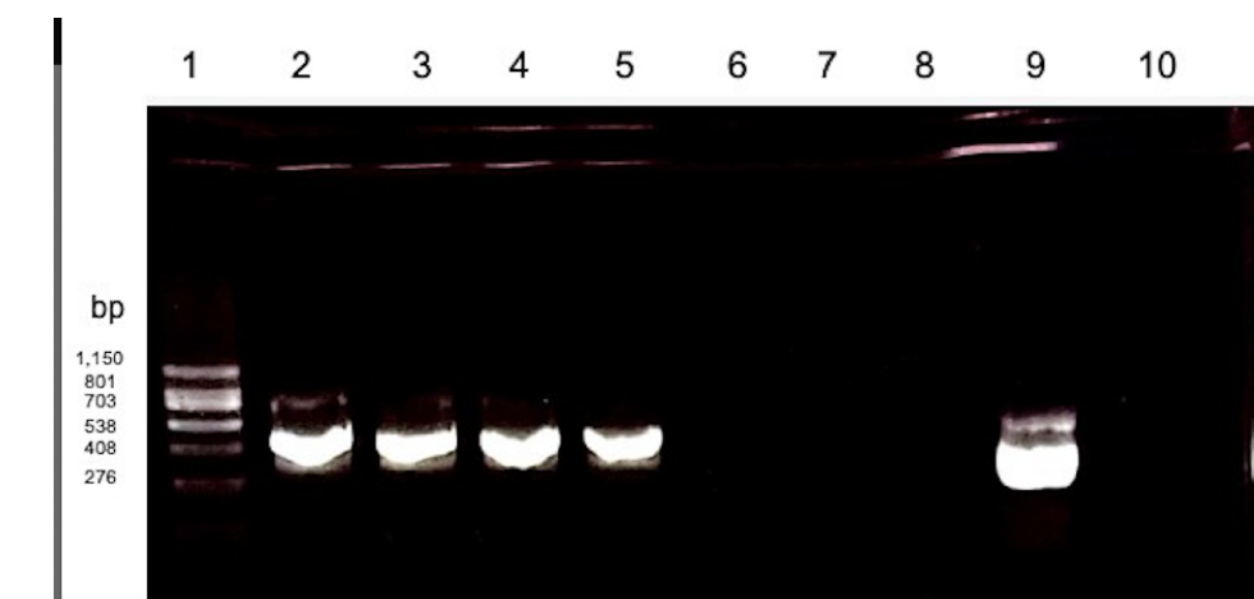


Figure 1. Banding patterns on a 1% agarose gel after multiplex PCR with Gp-9 allele-specific primers.

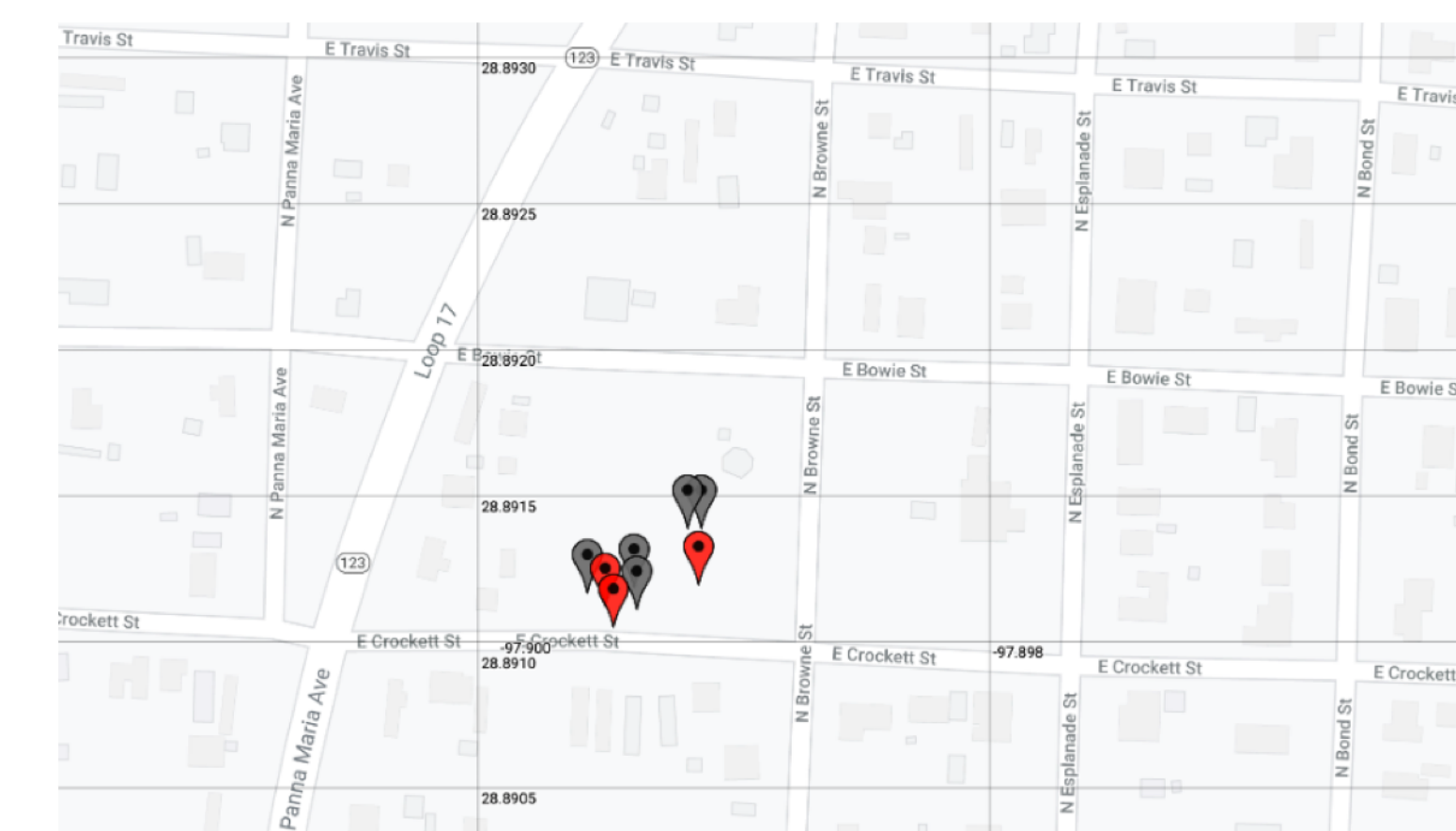
RESULTS

- 20 of 30 ant samples were identified as RIFA
- Remaining 10 were unidentified ant species
- 11 of 20 RIFA samples were identified as polygyne
- Remaining 9 were identified as monogyne



A queen fire ant and some workers

Figure 2. Zoomed-in view of samples identified as *Solenopsis invicta* collected in Karnes City between E Bowie St and E Crockett St marked by the pins. Red pins indicate monogynous colonies and grey pins indicate polygynous colonies.



Were the colonies predominately monogyne in these cities?

NO

- There was a 55% monogyne to 45% polygyne ratio

RESULTS

Were there differences in Texas Horned Lizard densities in areas with only monogyne colonies vs areas with polygyne colonies?

NO

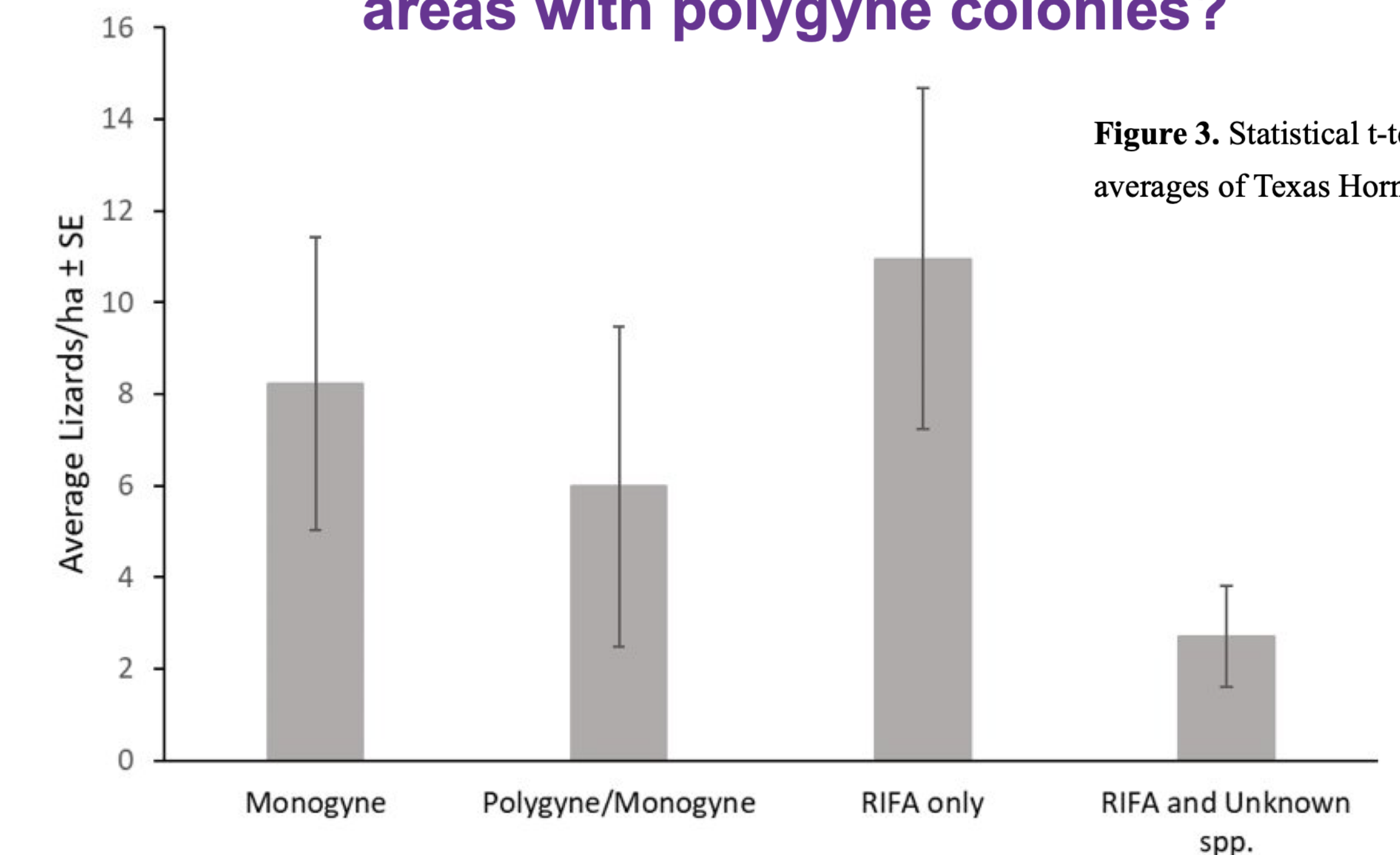
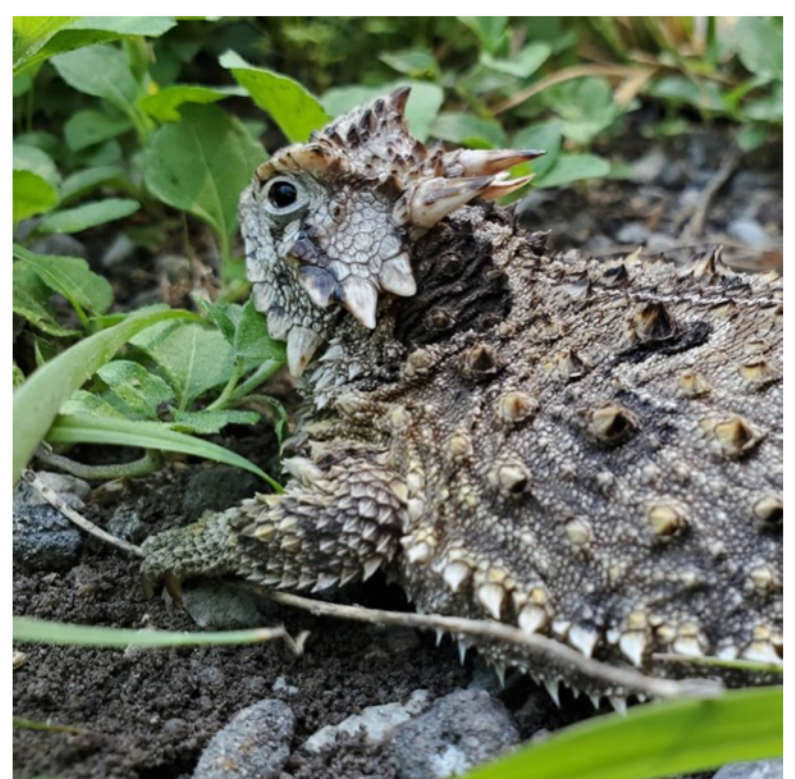


Figure 3. Statistical t-test with colony types and averages of Texas Horned Lizards per hectare.

- The highest density site was 19.6 lizards/ha
- The lowest density site was 0.5 lizards/ha
- Both locations had exclusively polygyne colonies present
- There is too much variation in the t-test to determine if colony type has an effect on Texas Horned Lizard density

DISCUSSION

- There was no apparent correlation between RIFA colony type and Texas Horned Lizard density
- The presence of mixed colonies was unexpected but studies show monogyne colonies must be present because they provide sterile males for the polygyne queens¹
- Some fire ant species were unidentified in Gen Bank so further studies are needed to see what species these ants were
- Future studies will utilize larger sample sizes to see if the same and then see if ratios of monogyne to polygyne colonies in an area has an effect on Texas Horned Lizard density



[1] Fritz, G. N. and R. K. Vander Meer. 2003. Sympatry of polygyne and monogyne colonies of the fire ant *Solenopsis invicta* (Hymenoptera: Formicidae). *Ann. Entomol. Soc. Am.*, 96(1):86-92.