

Background

Global climate change is causing more frequent and more intense wildfires that impact larger areas. Large quantities of nutrient-rich ash are a subsequent result of wildfires, which impacts local environments. Aquatic mosquito breeding sites are contaminated by ash fall and water runoff. Gravid female mosquitoes determine the suitability of a water source for egg deposition using olfactory cues. In this study, we tested mosquito behavior and development when exposed to various concentrations of ash-contaminated water.

Methods & Materials

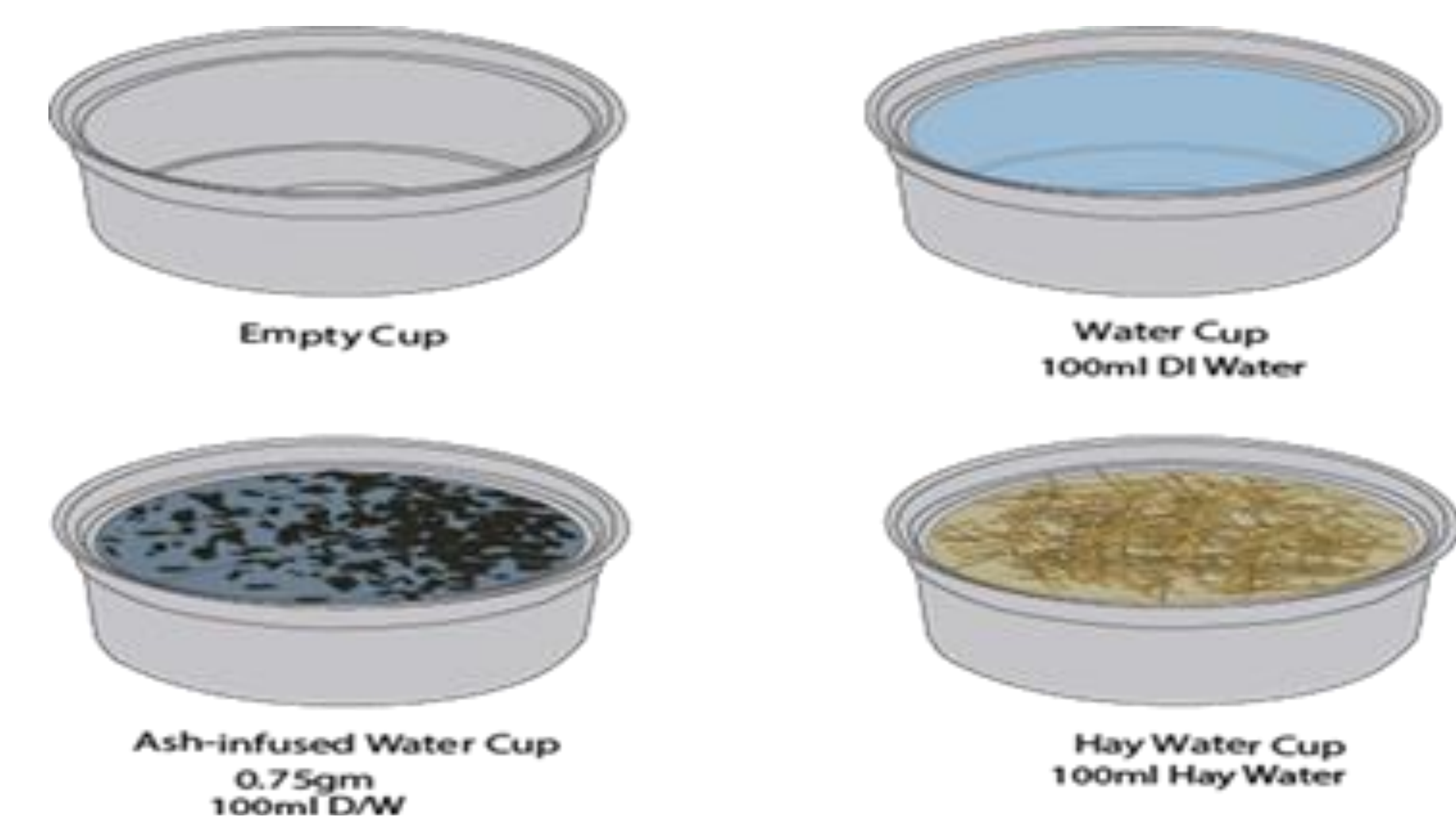


Figure 1: Different treatments used in this study

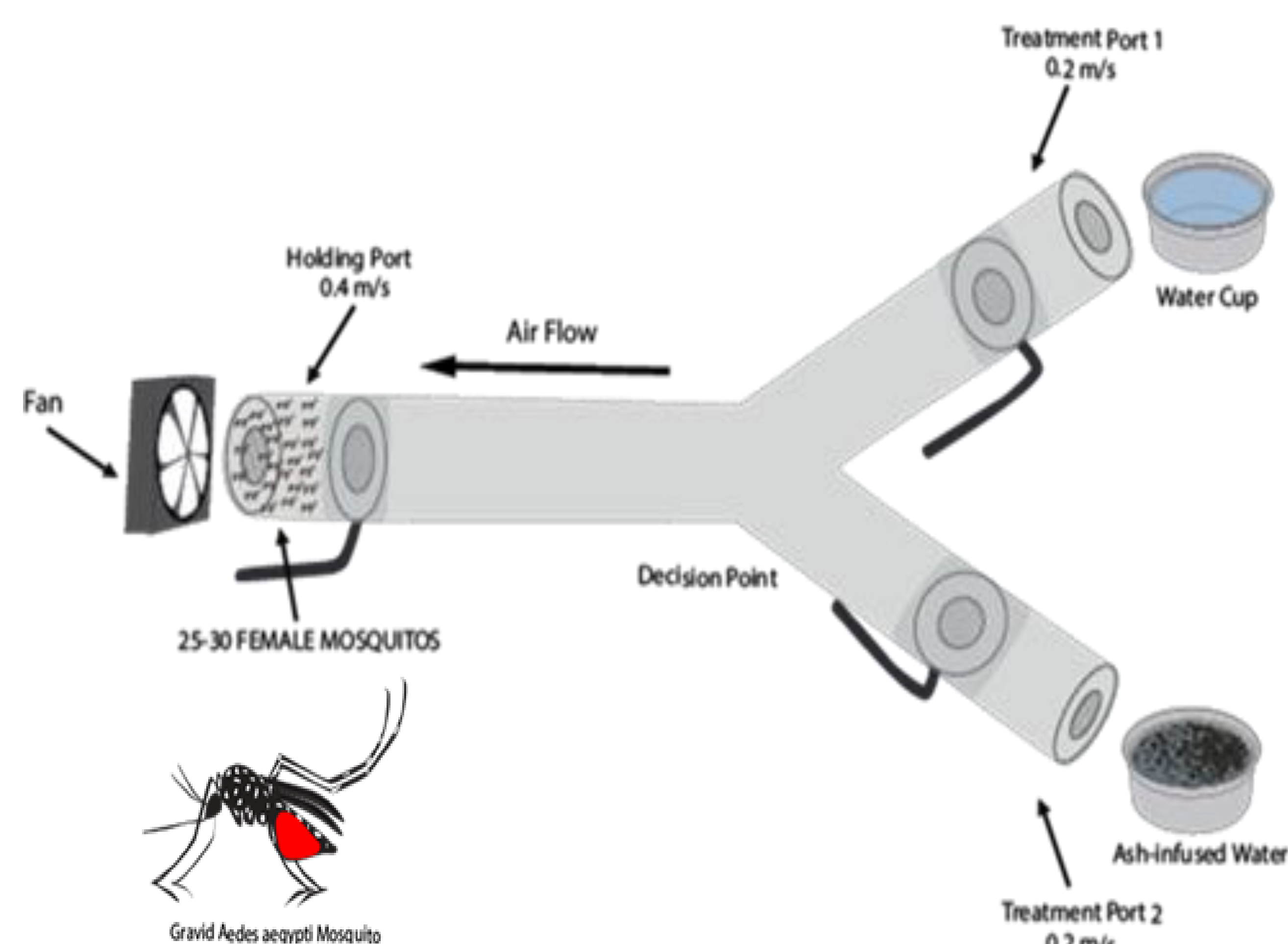


Figure 2: Schematic of the Y-Tube and experimental set up.

Results

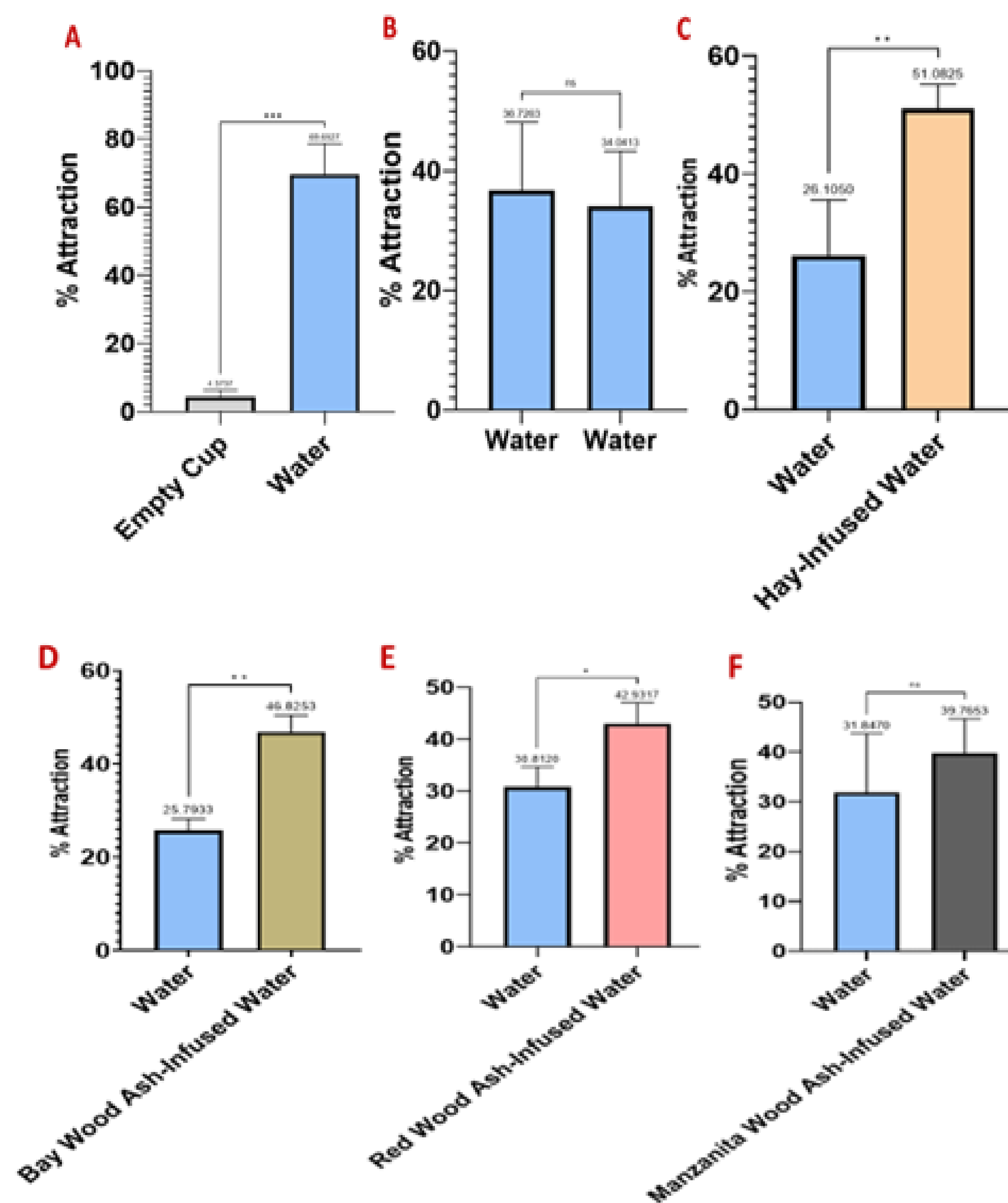


Figure 3: Y-Tube Olfactometer Experimental Results. Shown are the percent mosquitoes attracted to two different competing treatments. (A-C) These graphs represent controls to test for side bias and water attractiveness for gravid mosquitoes. (D-F) These graphs represent attraction of ash-infused water Vs Water. All competing treatments were statistically analyzed using a t-test. (***) $p < 0.0003$, (**) $p < 0.001$, (*) $p < 0.02$, n.s. non-significant)

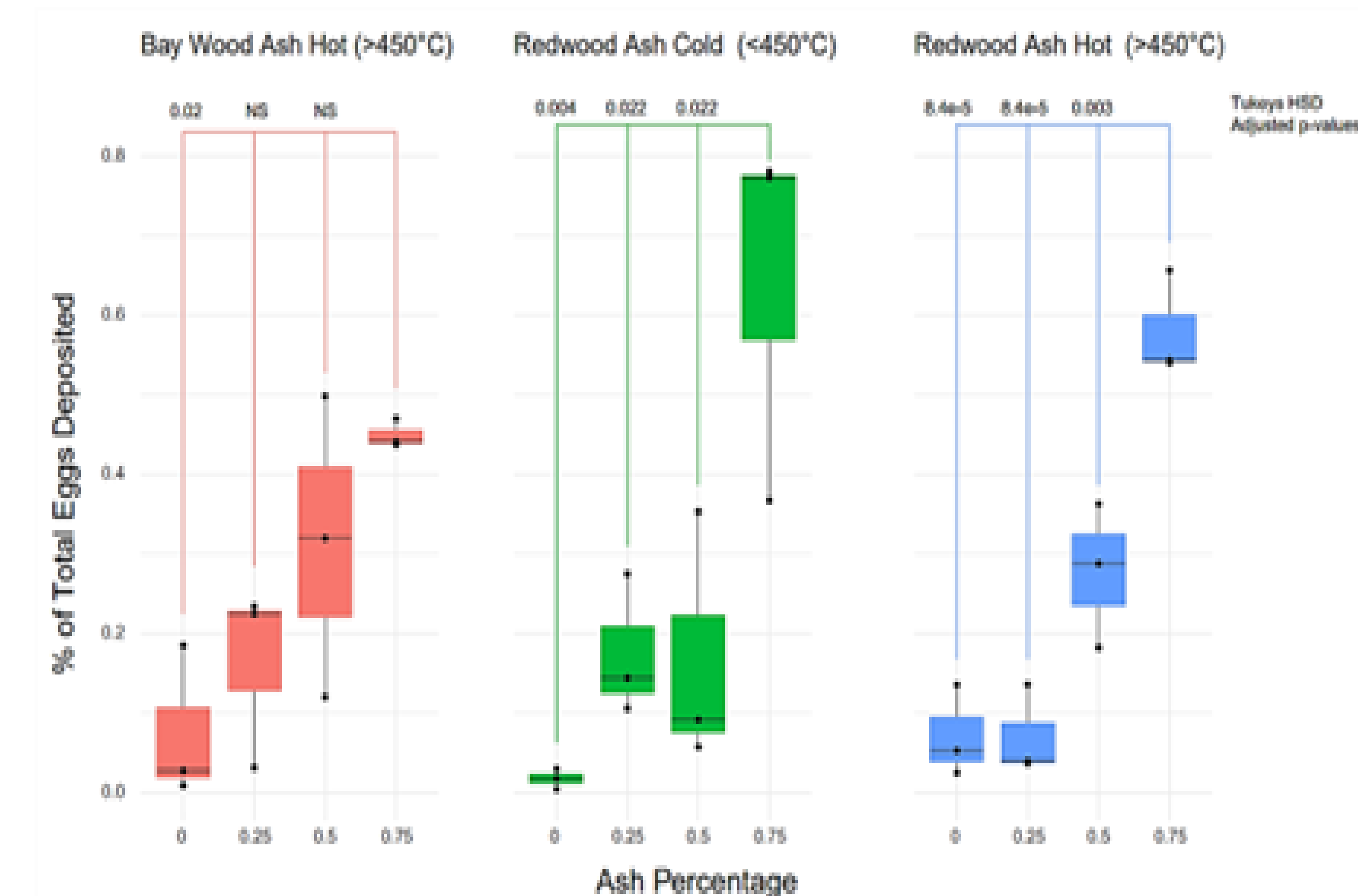


Figure 4: Effects of various wood ash concentrations on oviposition.

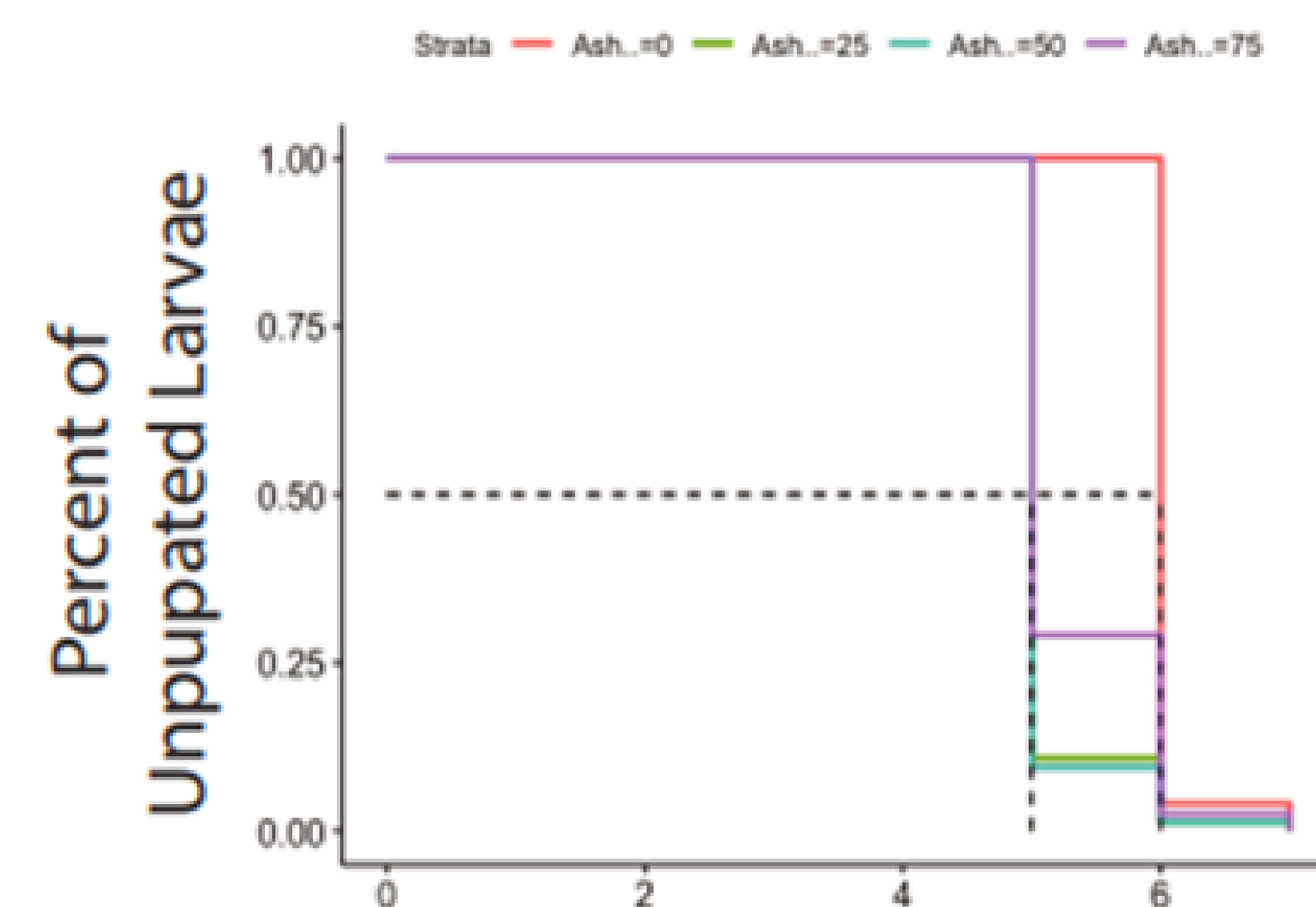


Figure 5: Larval development in water or ash-infused water at varying concentrations of ash.

Conclusion

- We found that larval development time decreased when water ash concentrations were increased. The addition of either Bay wood ash or Redwood ash to deionized water resulted in significantly higher attraction rates compared to deionized water alone.
- Wood ash-infused water was highly preferred as an egg-deposition substrate.
- Lastly, considering more frequent wildfires, our data suggest that ash-enriched breeding sites will shorten development times and increase local mosquito populations.

Acknowledgements

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