Characterization of Aedes mosquito habitat and larvicidal resistance to better control the vector in Northern Belize.

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INTRODUCTION

The incidence of Dengue viral infection is on an upward trend around the world and the WHO estimates that there are 390 million new cases every year. Many of these infections are in Central America, with 51,373 cases reported to the PAHO in 2017 thus far. In 2016, Belize had 192 probable cases, and an incidence rate of 55.17 per 100,000 people. All of these reported figures, however, are believed to be an underrepresentation of the actual prevalence of new dengue cases, both in Belize and in the Central America region. Currently, Dengue infection is prevented by controlling its vector, the Aedes mosquito.

HYPOTHESIS

Aedes mosquitos will show resistance to Temephos in the Orange Walk Region and show a preference for cleaner water sources.

METHODS

Water samples were collected from 94 houses in Northern Belize. The water samples were then tested on site to measure their conductivity, salinity, temperature, and total dissolved solids. For larvicidal resistance, 44 Ovitraps were placed in zones C and D in Orange Walk Town. Aedes eggs were collected once a week for five weeks. The eggs were then hatched and once the larvae developed to 3rd or 4th N stars they were placed in different concentrations of Temephos to see if resistance had developed. The larva were recorded at 24 and 48 hrs.

RESULTS

- **Temephos Concentration**
  - 0.625 mg/L: 100% killed
  - 0.125 mg/L: 100% killed
  - 0.025 mg/L: 50% killed
  - 0.005 mg/L: 0% killed

- **Weeks 1-3 Temephos Resistance**
  - Zone C: Control 100%, 0.005 mg/L 92.5%, 0.025 mg/L 100%, 0.625 mg/L 0%
  - Zone D: Control 100%, 0.005 mg/L 92.5%, 0.025 mg/L 100%, 0.625 mg/L 0%

- **Weeks 4-5 Temephos Resistance**
  - Zone C: Control 100%, 0.005 mg/L 90%, 0.025 mg/L 50%, 0.625 mg/L 0%
  - Zone D: Control 100%, 0.005 mg/L 90%, 0.025 mg/L 50%, 0.625 mg/L 0%

CONCLUSION

Aedes mosquitos seem to choose cleaner water sources to lay their eggs. Resistance to Temephos seems to be developing with the unregulated use of the larvicide.

DISCUSSION

- Tires were the most popular container for Culex and Aedes
- One container had both Aedes and Culex
- 37% of containers were positive for Larva
- Other containers included: car bumper, child’s push car, Styrofoam food container
- Aedes were found in Cistern, Vats, and Tanks while Culex were not
- Resistance to Temephos never killed all the mosquito larvae in their trial
- The highest concentration of Temephos (0.625 mg/L) killed all the mosquitos at both 24 hr. and 48 hr.

NEXT STEPS

- Further data analysis
- Expansion of Water samples in Orange Walk and Belize
- Continued testing of Temephos resistance

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CITATIONS