INTERNACIONAL VIRTUAL SCIENCE SUMPOSIUM

CLIMATE UNDERSTANDINGS – UNDERSTANDING EARTH AS A SYSTEM

PROJECT GLOBE OBSERVER

LANDSCAPE ANALYSIS FOR CORRELATION OF DENGUE CASES AT CEFET-MG

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RESUM

The study analyzed the proliferation of the Aedes aegypti mosquito using the Globe Observer - Mosquito Habitat Mapper app. Research instruments included mosquito traps installed in test fields, which were monitored biweekly and through sample collection at selected locations. The results showed the presence of mosquito larvae in some traps, which were quantified and analyzed. Comparisons were made between locations with higher larvae presence, and correlations were established between climatic and environmental factors and mosquito reproduction at the Nova Suíça and Nova Gameleira campuses of CEFET-MG. The study concluded that humidity, wind, temperature, and precipitation are directly linked to the reproduction of the dengue-transmitting mosquito, especially when the last two factors are high.

Keywords: Aedes aegypti, Traps, Microclimate, Globe Observer, CEFET-MG.

Introduction

- Dengue cases in Brazil have surged, with over 2.3 million probable cases and 830 deaths by March 2024, worsened by an abnormal El Niño, leading to public health emergencies.
- This study focuses on analyzing the spread of dengue across CEFET-MG's campuses, using landscape correlation to propose effective vector control measures.
- The research examines the Aedes aegypti life cycle, with an emphasis on early intervention strategies.
- The study also compares data from a 150-day drought period in 2024 with a previous study conducted in 2023, which was influenced by a strong El Niño.
- The research is important for formulating hypotheses and proposing measures to combat the mosquito vector of dengue and related diseases within the CEFET-MG community.

Question and Hypothesis

Q: How do microclimatic conditions influence the proliferation of *Aedes aegypti* on CEFET-MG campuses?

The microclimate of each location, influenced by the amount of vegetation, water availability, and temperature variations, can create more or less favorable conditions for larval proliferation. Areas with higher humidity and shade tend to sustain breeding sites for longer, while locations more exposed to sunlight may experience higher water evaporation, limiting larval development. Additionally, human activity can indirectly influence this dynamic, both by attracting adult mosquitoes in search of food and by affecting the maintenance of breeding sites through activities such as cleaning or removal of the traps. Thus, Campus II, with greater vegetation cover and humidity, is expected to have recorded a higher number of larvae compared to Campus I, where these conditions are less favorable.

Objectives

1. Identify the presence of the Aedes aegypti mosquito on Campuses 1 and 2 of CEFET-MG
2. Use the Globe Observer app to identify mosquito larvae using the scientific method.
3. Correlate the data obtained with the local microclimate and vegetation
4. Promote actions that contribute to greater awareness within the school environment in the fight against Aedes aegypti

Materials

- Mobile devices with internet access;
- PET bottles;
- Insulating tape;
- Adhesive labels for project identification;
- Plastic plate;
- Personal protective equipment (gloves, insect repellent);
- GPS for geolocation of collection points;
- Microtulle;
- Scissors
- Water
- Sandpaper
- Beta fish food;
- Globe Observer App

Source: Authors' collection, 2024.

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Methods

1. Literature review and data collectione

• Research through bibliographic reviews on Aedes aegypti and transmitted diseases.

• Analysis of data from the Epidemiological Bulletins of the City of Belo Horizonte and the Municipal Health Department.

2. Training and the Globe Observer App

• Participation in a training course (*Globe Observer Program*) from April to June 2024 via AEB Escola (EaD).

• Use of the *Mosquito Habitat Mapper, Land Cover* and *Trees* protocols through the *Globe Observer* app.

Source: *GLOBE Observer*, 2024

3. SELECTION OF COLLECTION LOCATIONS

- Choice of locations based on criteria that maximize the likelihood of finding proliferation hotspots, such as: shaded areas, humidity, proximity to stagnant water and places with high foot traffic

- A total of **16 catchers** were installed, distributed between **7 on Campus I** and **9 on Campus II** of **CEFET-MG**, as shown in the following images

Campus I - Mapping of the traps

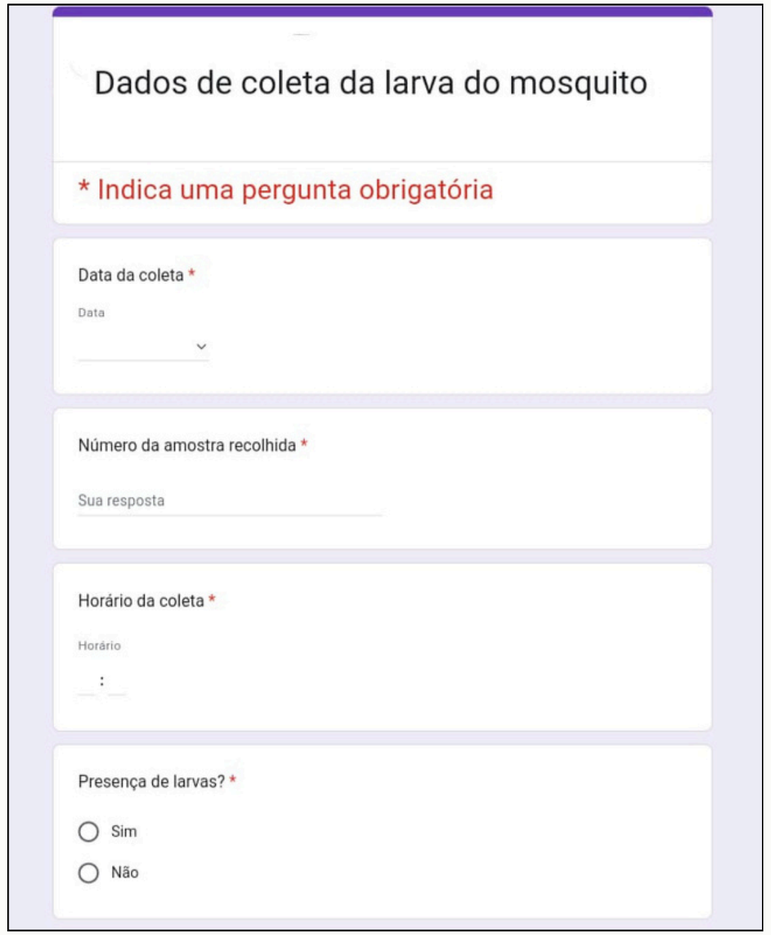
Source: Author's collection, 2024.

Campus II - Mapping of the traps

Source: Authors' collection, 2024.

4. COLLECTION AND DATA REGISTER

- The traps are monitored every two weeks to allow the larvae to develop properly and make it easier to identify the species
- Collections are carried out around 12 noon or at the same time.
- The information collected is documented in a *Google Forms* form, including the date, location and number of mosquitoes captured.



Source: Author's collection, 2024.

Results

The final collection on 12/13/2024 detected larvae in some traps at the Nova Gameleira Campus. After analysis, bleach was added to eliminate them. A total of 50 larvae and 6 adult mosquitoes were found, mainly in humid areas with dense vegetation. Water turbidity made precise counting difficult. A portable microscope was used for analysis.

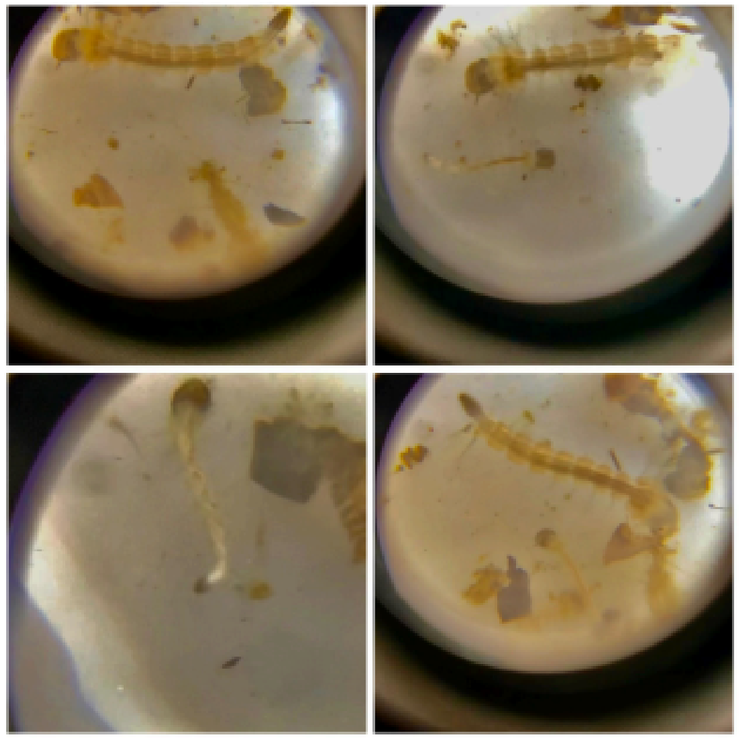
The larvae were identified as Aedes aegypti using a microscope and the Globe Observer app, following the Mosquito Habitat Mapper protocol. Key characteristics such as a short, thick siphon, few setae, smooth body, and "S"-shaped jerky movement confirmed the identification.

	Trap			
Data	8	9	11	12
Species	*Ae. aegypti*	*Ae. aegypti*	*Ae. aegypti*	*Ae. aegypti*
Eggs	0	0	0	0
Larva	9	8	18	15
Adult	5	1	0	0
Pupa	1	1	0	0

Source: Author's collection, 2024.

Results

Source: Author’s collection, 2024.



Source: Author’s collection, 2024.

Discussions

- **Microscope** and ***Globe Observer*** **confirmed the presence of** ***Aedes aegypti*** based on morphological characteristics and movement pattern.
- **Larvae were found only on Campus II**, due to its **favorable microclimate** (more vegetation, humidity, and shade), while Campus I had less favorable conditions.
- **Human circulation can affect proliferation**, either reducing larvae in more cleaned areas or encouraging oviposition near areas with more movement.
- **Shade** helped maintain water and **larval development** in the **11th trap**, while the **8th trap**, more **exposed to sunlight**, had more **adult mosquitoe**s.
- The **2023 study** was conducted under the influence of **El Niño**, while **2024** was a more **stable period**, possibly transitioning to **La Niña**, which may have impacted the results.

Conclusion

In conclusion, microclimates with vegetation and high humidity are linked to the proliferation of Aedes aegypti. The study also highlighted the Globe Observer app's effectiveness, particularly its Mosquito Habitat Mapper protocol. The research, conducted over 150 days without rain in Belo Horizonte, found that climatic factors, including extreme temperatures and heatwaves, played a key role in the rise of dengue cases in early 2024, influenced by the El Niño phenomenon.

Acknowledgments

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Badges

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