Use of Ovitrap for The Spatial Mapping of *Aedes* spp. in The Endemic Area of Dengue Fever of Baitussalam District Aceh Besar

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ABSTRACT

The strategy to control the vector of dengue fever through regular monitoring is an effective mitigation effort. Monitoring of dengue vectors is generally in the larval phase. Besides regular monitoring in the larval phase, regular monitoring can also be in the egg phase. Regular monitoring of Aedes eggs using an ovitrap is not limited to seasons. This research aims to map the spatial distribution of *Aedes* spp. using an ovitrap in Baitussalam District, Aceh Besar. This research uses the observation method and the sample houses whereas the ovitrap uses purposive sampling. The number of samples observed was 50 houses in 5 villages. Analysis used GPS Essentials application and Google Earth Pro software. The results found four villages where *Aedes* spp. eggs the spatial distribution in Batussalam District, Aceh Besar. The villages where were found positive ovitrap are Gampong Blangkrueng, Gampong Kajhu, Gampong Baet, and Gampong Cadek. Ovitraps proved to be an effective and low-cost method for mapping *Aedes* spp. and in efforts to control dengue fever.

Keywords**:** *Aedes* spp., DHF, ovitrap, spatial mapping.

ABSTRACT

Strategi pengendalian vektor penyakit DBD (Demam Berdarah Dengue) melalui pemantauan berkala merupakan upaya mitigasi yang efektif. Selama ini pemantauan berkala vektor DBD yang umumnya banyak dilakukan adalah pada fase larva. Selain pemantauan berkala pada fase larva dapat juga dilakukan pemantauan berkala pada fase telur. Pemantauan berkala telur *Aedes* dengan menggunakan *ovitrap* tidak dibatasi musim. Tujuan penelitian ini adalah untuk melakukan pemetaan spasial sebaran *Aedes* spp. dengan menggunakan *ovitrap* di Kecamatan Baitussalam Aceh Besar. Penelitian ini menggunakan metode observasi dan penetapan rumah sampel tempat peletakkan *ovitrap* secara *purposive sampling*. Jumlah rumah yang diobservasi sebanyak 50 rumah pada 5 gampong. Analisis menggunakan aplikasi GPS Essentials dan software Google Earth Pro. Hasil penelitian menunjukkan bahwa terdapat 4 gampong sebaran telur *Aedes* spp. di Kecamatan Batussalam Aceh Besar. Gampong yang positif ditemukan telur *Aedes* adalah Gampong Blangkrueng, Gampong Kajhu, Gampong Baet dan Gampong Cadek. *Ovitrap* terbukti menjadi metode yang efektif dan berbiaya rendah untuk pemetaan *Aedes* spp. dalam upaya pengendalian DBD.

Keywords**:** *Aedes* spp., DBD, *ovitrap*, pemetaan spasial.

A. INTRODUCTION

Indonesia is a tropical country, a climate that significantly influences the prevalence of endemic diseases transmitted by mosquitoes, such as malaria, dengue fever (DBD), and filariasis (Tejasaputra, 2014). Mosquitoes are often considered detrimental organisms due to their bites, which disturb human life and transmit various diseases. The mosquito species that can act as disease vectors include the genera Anopheles, Culex, Aedes, and Mansonia (Munif, 2009).

Aedes spp. mosquitoes are responsible for transmitting DBD. The spread of this disease occurs rapidly across various parts of the world, including Indonesia. The first DBD cases were reported in Jakarta and Surabaya in 1968, and the incidence of dengue has continued to rise, leading to outbreaks throughout Indonesia. In some months, the number of DBD cases can reach dozens of individuals infected with the dengue virus. The highest numbers of DBD cases have been recorded in cities such as Tangerang, Bandung, Kendari, Subang, and Aceh.

Every year, there are always DBD cases reported in Indonesia, and these cases can emerge in areas where they have never been recorded before. Therefore, it is crucial to conduct data collection and monitoring through mapping. The Ministry of Health of Indonesia states that by 2024, DBD cases are expected to triple compared to 2023. The Health Office of Aceh Province has reported no DBD cases in Aceh Besar throughout 2023-2024. However, in 2022, Aceh Besar recorded 157 DBD cases, a significant increase from the 37 cases reported in 2021.

Preventive measures for DBD include spatial mapping of Aedes spp. using ovitraps. The use of ovitraps is an innovative method for vector control of DBD (WHO, 2005). According to Sayono (2010), an ovitrap is a device used to trap mosquito eggs. This tool was developed by Fay and Eliason in 1966 and disseminated by the Centers for Disease Control and Prevention (CDC) for Aedes aegypti surveillance. The sensitivity of ovitraps is quite high, even at low vector densities (Santos et al., 2003).

Ovitraps are considered effective for spatial mapping of Aedes spp. because they are easy to construct and inexpensive, utilizing materials readily available in the surrounding environment. According to Athaillah et al. (2017), studies have been conducted in the Syiah Kuala District, particularly around Unsyiah, and similar research in Kopelma Darussalam has found data on the distribution of Aedes spp. using ovitraps, as reported by Aza Annisa Utami et al. (2022). However, data on the distribution of Aedes spp. in Baitussalam District has not yet been

obtained. Thus, this research aims to facilitate vector control to prevent the spread of dengue fever in Baitussalam District.

Based on the background above, this study focuses on the Use of Ovitrap for The Spatial Mapping of Aedes spp. in The Endemic Area of Dengue Fever of Baitussalam District, Aceh Besar. This research is expected to provide information about the spatial distribution of Aedes spp. using ovitraps in Baitussalam, Aceh Besar. The objective of this study is to carry out spatial mapping of Aedes spp. using ovitraps in Baitussalam District, Aceh Besar.

B. METODE PENELITIAN/RESEARCH METHOD

1. Lokasi Penelitian

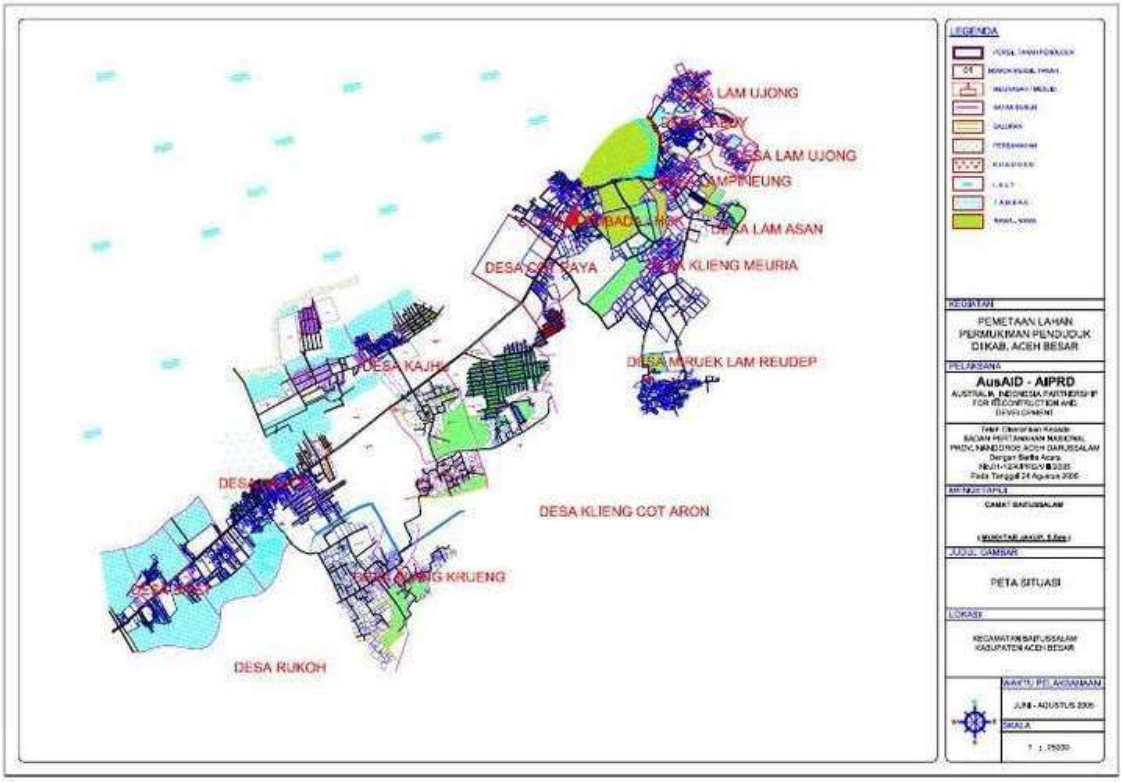

Figure 1. Research location in Baitussalam District, Aceh Besar.

This research was conducted in Aceh Besar Regency. Aceh Besar Regency is located between 5°2′ – 5°8′ N and 9°50′ – 9°58′ E, covering an area of 2,969.00 km². Aceh Besar Regency consists of 23 districts and 604 villages. The research location is in Baitussalam District, specifically in the villages of Blangkrueng, Baet, Cadek, Kajhu, and Lam Ujong. Baitussalam District was chosen as the research location because it is an endemic area for dengue fever cases.

2. Data Collection

This research utilized an observation method. The activities were conducted in Baitussalam District, Aceh Besar, in five villages: Blangkrueng, Baet, Cadek, Kajhu, and Lam Ujong. The selection of sample houses for placing ovitraps was done through purposive sampling. Ovitraps were placed only in houses whose owners agreed to participate as research sites, based on information from the local community regarding the presence of Aedes spp. mosquitoes. The ovitraps were used to capture Aedes spp. eggs. A total of 50 houses were observed. To map the distribution of Aedes spp. using ovitraps, the GPS Essentials application (mictale.com) was used to track each house, and maps were created using Google Earth Pro software (Google Inc).

3. Data Analysis

The data obtained consisted of tracking results from the GPS Essentials application (mictale.com) on Android, which were then exported to Google Earth Pro (Google Inc). Google Earth Pro provided visual representations in the form of maps for each village, indicating the ovitraps that tested positive and negative for mosquito eggs.

C. RESULT AND DISCUSSION

RESULT

The research results indicated that in each village, there were ovitraps that tested positive (in 4 villages) and negative (in 1 village). This data was compiled for each village to illustrate the location of the sample houses. The green color represents negative ovitraps for Aedes eggs, while the red color indicates positive ovitraps for Aedes eggs.

Gambar 2. Peta 5 gampong Kecamatan Baitussalam: Blangkrueng, Baet, Cadek, Kajhu, dan Lam Ujong Blangkrueng

Figure 3. Condition of houses regarding the positivity or negativity of ovitraps

The village of Blangkrueng has many houses in complexes. Some complexes have houses that are closely spaced, while others are more spread out. Blangkrueng is also categorized as having a population density that is not too high. Many plants are grown in front of the houses, and water storage containers are rarely found, which influences the spread of positive ovitraps based on the surrounding environment. The image above also shows a row of houses where all the ovitraps tested positive for Aedes eggs, with the houses positioned close together.

Figure 4. Condition of houses regarding the positivity or negativity of ovitraps.

In the village of Kajhu, the high population density and the close proximity of houses facilitate Aedes mosquitoes in finding food sources (blood), along with the abundant vegetation in the area. The settlement also has a significant amount of waste present. The

image above shows both positive and negative ovitraps for Aedes eggs found within the same area.

Cadek

Figure 5. Condition of houses regarding the positivity or negativity of ovitraps.

The village of Cadek has both densely populated and less densely populated areas, resulting in the presence of both positive and negative ovitraps. In the densely populated areas, there is a significant accumulation of waste around the houses, and many large plants grow in the vicinity. Additionally, there are many newly constructed homes, which tend to have fewer plants and remain cleaner. These conditions also influence the presence of mosquitoes in the area.

Baet

Figure 6. Condition of houses regarding the positivity or negativity of ovitraps.

The village of Baet is a densely populated area, but it has limited vegetation, resulting in few positive ovitraps for Aedes eggs being found.Lam Ujong

Figure 7. Condition of houses regarding the negativity of ovitraps.

The village of Lam Ujong is relatively new, but it already has many residents. The environment in Lam Ujong is well-maintained and clean, resulting in no positive ovitraps being found in this area. Additionally, waste disposal is managed effectively.

DISCUSSION

Based on research conducted in the Baitussalam District of Aceh Besar, which includes five villages—Blangkrueng, Baet, Cadek, Kajhu, and Lam Ujong—it was found that the distribution of Aedes spp. using ovitraps varied across each village. Four villages in Baitussalam, Aceh Besar showed the presence of Aedes spp. eggs. The population density in areas where houses are in close proximity facilitates Aedes mosquitoes in finding food sources (blood). This aligns with the statement by Purnamasari et al. (2016), which indicates that closely situated houses make it easier for mosquitoes to lay their eggs in other homes, as they typically fly an average distance of 100 to 200 meters in search of breeding sites.

In areas with low population density and fewer plants, there were fewer positive ovitraps for Aedes eggs, indicating a lower mosquito presence. This is consistent with the findings of Aza Annisa Utami et al. (2022), which stated that regions with the lowest Aedes mosquito distribution compared to other locations were not densely populated and lacked surrounding vegetation that could serve as breeding sites for mosquitoes.

The green areas on the map indicate negative results for Aedes spp., meaning no Aedes spp. eggs were found, while the red areas indicate positive results, meaning Aedes spp. eggs were detected. The villages where Aedes eggs were found include Blangkrueng, Kajhu, Baet, and Cadek. Some villages displayed both negative and positive results, suggesting a potential expansion of Aedes spp. distribution, while Lam Ujong showed a negative result across all samples, indicating no Aedes spp. eggs were found. The absence of Aedes eggs does not imply

their complete absence, as not all houses were included in the study. Ovitraps have proven to be an effective and low-cost tool for mapping Aedes spp. in efforts to control dengue fever.

D. CONCLUSION

Based on the research findings, it can be concluded that the villages where Aedes eggs were positively identified are Blangkrueng, Kajhu, Baet, and Cadek. Ovitraps have proven to be an effective and low-cost method for mapping Aedes spp. in efforts to control dengue fever.

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