Standard Operating Procedure for the assembly and deployment of the Biogents Gravid *Aedes* Trap

Effective Date: 19 November 2021

SOP #: GAT-2021

PacMOSSI
Pacific Mosquito Surveillance Strengthening for Impact

Scope

This Standard Operating Protocol (SOP) outlines the materials and processes required to assemble, use and maintain the Biogents-Gravid *Aedes* Trap (GAT).

Overview

Description: Gravid traps were initially designed and trialled by Eiras et al. (2014). There are currently two commercially available gravid traps: the BioCare® autocidal gravid ovitrap (AGO) and the Biogents gravid *Aedes* trap (GAT). Gravid traps attract gravid (egg-carrying) females seeking a site for egg laying, as they contain water infused with organic matter such as hay, and are modified to capture the females. These traps use funnels, sticky cards, a residual adulticide or a thin film of oil to prevent captured mosquitoes from escaping.

Target species and physiological states: Gravid traps capture gravid female mosquitoes that oviposit in containers, especially *Aedes* species.

Entomological surveillance indicators: Adult vector occurrence and density.

Advantage: The GAT is cheap and simple to use, does not require electricity or CO_2.

Disadvantage: Relatively low catch rates as GATs only target gravid females. If a sticky surface is used, it can damage the samples.

Sample period: Usually deployed for 5-7 days at a time. Gravid traps should not be deployed for longer than a week producing adults from the eggs of gravid females attracted to the trap.

Data: Total number of females per sampling effort (by species).

Materials

- ◯ Capture chamber
- ◯ Organic matter for infusion
- ◯ Bucket
- ◯ Water (3 L / trap)
- ◯ Plug
- ◯ Pencil
- ◯ Sticky card/insecticide
- ◯ Labelling paper
- ◯ Barrier net
- ◯ Forceps
- ◯ Entrance funnel
- ◯ Vials (1 / trap)
- ◯ Ring
- ◯ Data device (phone or tablet)
- ◯ Rough sponge
- ◯ Rubbish bag

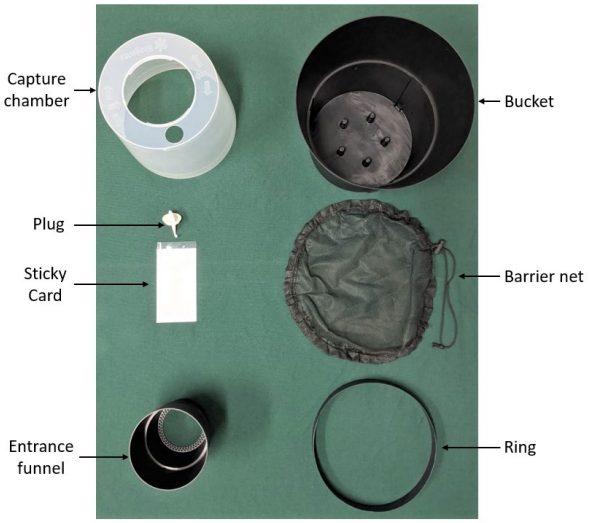
Trap preparation

The smell of new traps might repel mosquitoes. Therefore, assemble the trap and put outside for two weeks before using to get rid of the smell.

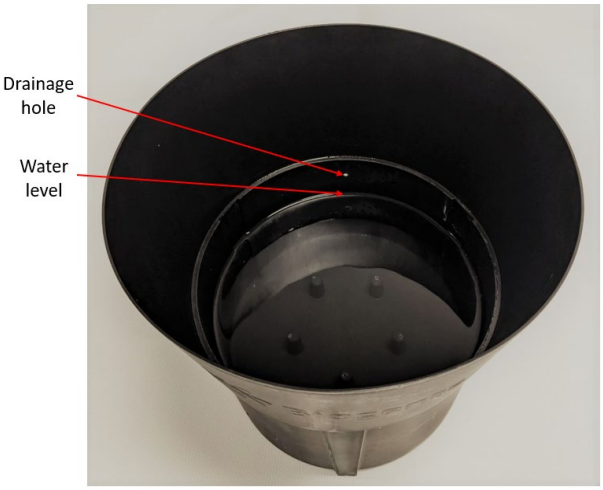
Trap assembly

(These instructions are based on the Biogents GAT manual. To review their instructions see https://eu.biogents.com/wp-content/uploads/BG-GAT-Manual-EN-ES-FR-IT-homeowner-web.pdf)

1. **Gather all trap components.**
    a. **Note that the trap can be set up with either sticky cards, a residual adulticide or a thin film of oil to kill the adults that enter the trap. Decide which trapping configuration you will use in advance.**



2. **Pour water (even tap water is fine) into the bucket until it fills to a level ~1 cm below the drainage hole (~3 L).**



3. **Organic material in the water will act as a lure. To create the lure, Insert organic material (1.5 g per litre of water) such as alfalfa pellets (pictured) or dried grass into the water in the gravid trap.**

   a. Use only a small amount of organic material to catch *Aedes aegypti* or *Aedes albopictus* mosquitoes. If the infusion is too strong you may notice a powerful odour resulting in the capture of large numbers of *Culex quinquefasciatus* and/or house flies.

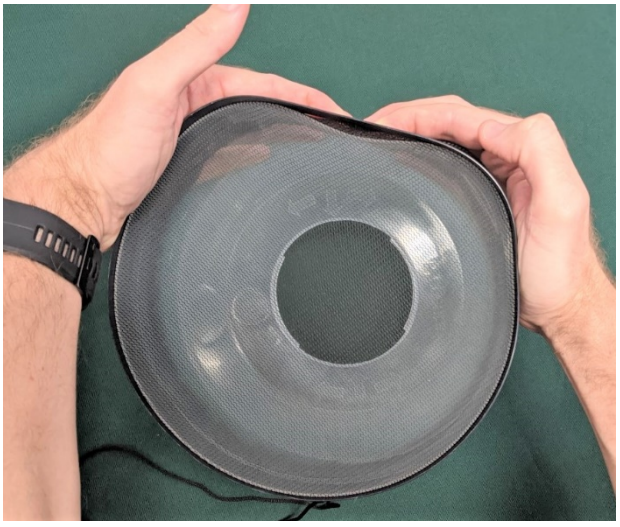
   b. Alternatively, a hay infusion could be prepared in advance by adding 1 tablespoon of finely ground hay or grass to 4 L of water and leaving overnight in a covered container. Add the hay infused water directly to the gravid trap.

4. **Cover the base of the capture chamber with the barrier net and secure the net by tightening the draw-string**

   a. If using residual insecticides or a light coating or oil to kill the trap adults, apply this to the inside of the capture chamber before applying the barrier net.

5. **Secure the ring over the barrier net.**

   a. Due to the tight fit, hold the ring on the base with both hands and push the side of the capture chamber base inwards slightly so that it fits inside the ring.



b. Ensure the black ring is evenly placed over the base of the capture chamber.

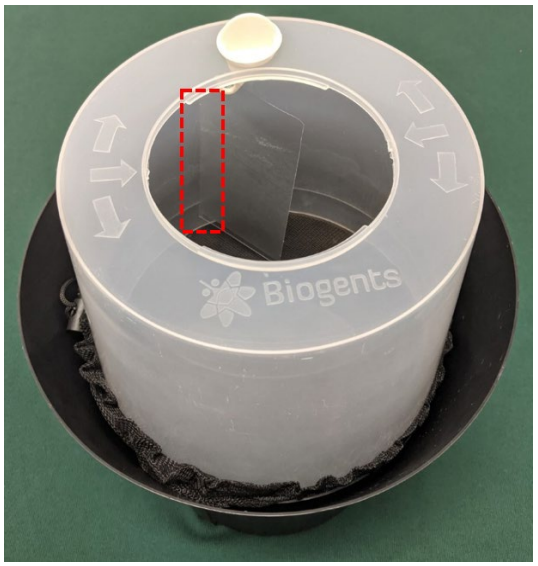
6. Turn the capture chamber over so that the barrier net is on the bottom and place it on top of the bucket.

7. If using a sticky panel to secure catches inside the capture chamber:

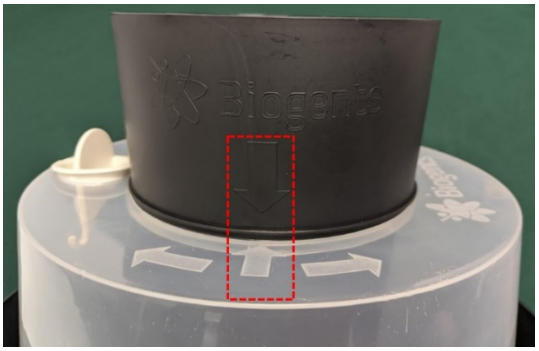
a. remove the plastic circular disc on the top of the capture chamber.

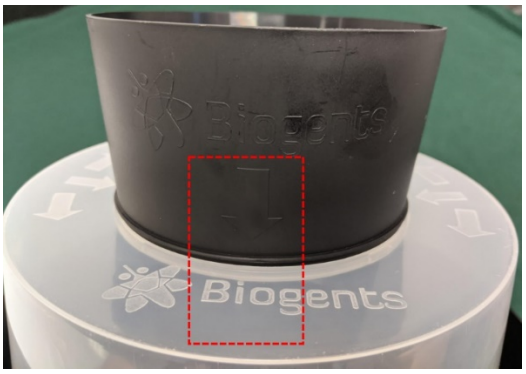
b. Insert the white plug with hook into the small hole made when the circular disc was removed.

c. Peel off both sides of paper from the sticky panel and insert the plug hook into the hole on the top of the sticky panel. Ensure the long side of the sticky panel is beside the internal wall of the capture chamber. Mosquitoes will fly around the internal wall of this chamber until they stick to the panel.



8. Insert the entrance funnel into the top of the capture chamber with the arrow of the entrance funnel pointing to the inward arrow on the capture chamber.



9. Lastly, twist the entrance funnel 90 degrees so that the arrow on the entrance funnel points at the Biogents symbol on top of the capture chamber.	

Additional notes:

- To ensure that the GAT does not become a larval habitat producing adult mosquitoes, maintain/service the GAT every week by emptying the old water, cleaning and refilling the trap with fresh water and infusion. If you are unable to service this trap weekly then place *Bti* ("mosquito dunks") or a similar product inside the water to prevent larvae growing.

- Samples may go mouldy if left inside the GAT capture chamber for too long. Note the condition of the samples and adjust the duration that the trap is left out accordingly.

Trap location selection

1. Talk with the householders about the location to place the trap. Ensure that both you and the householders are happy with the location of the trap so they will be unlikely to move it. If no suitable trap location is identified , thank the householders for considering placing a GAT on their property and seek another household to host the GAT.

2. When operating the trap always make sure that there is nothing within 50 cm above the trap cover.

3. Ensure the trap is placed in a location without anything dangerous (electrical concerns, trip hazard, aggressive dog nearby) to the occupants or staff servicing it.

4. Discuss permission to service the trap if the occupant is not home. If permission is granted, ensure the trap is in a location that is easily accessible when the occupant is absent.

5. Ensure that trap is in a safe location where it is unlikely that children will play with it or that animals or passers-by will damage it.

6. Do not place the trap on an ant nest or touching the wall under a light where animals such as geckos may be active and interfere with mosquito samples. If ants attack the mosquito samples either move the trap or apply a preventative substance (for example, petroleum jelly or vaseline) on the rope or cords.

7. The specific location where the GAT is placed will greatly affect the mosquito capture rate.

    a. Place the trap on the ground.

    b. Place the trap in locations sheltered from wind, water (rainfall or irrigation) and direct sunlight. Not only do these environmental factors negatively influence mosquito activity they also can impair trap effectiveness.

    c. The dark colours of the trap are attractive to mosquitoes so ensure the trap is not hidden within bushes, tall grass or surrounded by many objects (especially dark ones) and therefore hard for a mosquito to see.

    d. Place the trap within areas where mosquitoes will rest (relatively dark or cool places which may include heavily shaded or bushy yards).

Servicing the trap

1. **Check that the trap has not been tipped over, damaged or that the barrier net is not hanging in the water in the bucket. If any of these have occurred note that the trap is not working correctly.**

2. **Label the catch. Note trap, location and date on a small piece of paper using a pencil.**

3. **Remove the entrance funnel and remove the sticky panel.**

4. **Collecting the mosquito samples.**
   - **a.** Use fine forceps to carefully pull the mosquitoes off the sticky panel.
   - **b.** Place the mosquito samples in a vial.
   - **c.** Place your collection label into the vial.
   - **d.** Screw lid back onto vial and store it.

5. **Replace the sticky panel in the GAT as described above.**

6. **Secure the entrance funnel back onto the capture chamber as described above.**

7. **Service the bucket:**
   - **a.** Empty the water/infusion out of the bucket.
   - **b.** Clean the bucket with a rough sponge.
   - **c.** Refill the bucket with water and infusion as described above.

8. **Place the capture chamber back on the service bucket and place the trap back**

9. **Temporarily store the mosquitoes in labelled collection vials until processing and long-term storage. For further details see** SOP# MOS-2021.

Videos

To watch videos on how to assemble and deploy GATs go to:

- Biogents The BG-GAT: Passive mosquito trap against *Aedes* mosquitoes - https://eu.biogents.com/bg-gat/#1510135224840-4f68d395-5d31
- University of South Australia and PacMOSSI How to set a BG GAT mosquito trap - https://youtu.be/32bn4wUR8CA

Safety/Risk assessment

Your workplace may require you to complete a risk assessment prior to conducting field work. There are a range of risks to which field workers could be exposed, and when sampling with GATs may include:

- Mosquito transmitted infections
- Dog bites
- Trip hazards

For further details on safety and risk assessments see SOP# MOS-2021.

References

Biogents Gravid *Aedes* Trap user manual
https://eu.biogents.com/wp-content/uploads/BG-GAT-Manual-EN-ES-FR-IT-homeowner-web.pdf

Eiras AE, Buhagiar TS, Ritchie SA. (2014) Development of the Gravid *Aedes* Trap for the capture of adult female container–exploiting mosquitoes (Diptera: Culicidae). *Journal of Medical Entomology*.
https://doi.org/10.1603/ME13104

Ritchie S.A., Buhagiar T.S., Townsend M., Hoffmann A., Van Den Hurk A.F., McMahon J.L., Eiras A.E. (2014). 'Field validation of the gravid *Aedes* trap (GAT) for collection of *Aedes aegypti* (Diptera: Culicidae)' *Journal of Medical Entomology*.
https://doi.org/10.1603/ME13105

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