

Standard Operating Procedure for BG- Sentinel Assembly and Deployment

Effective Date: 22 June 2022

SOP #: BGS-2021



PACMOSSI

Pacific Mosquito Surveillance
Strengthening for Impact

Scope

The purpose of this Standard Operating Procedure (SOP) is to outline the materials and steps required to assemble, deploy and service the BG-Sentinel version 2 mosquito trap.

Overview

Description: The BG-Sentinel trap is a mechanical trap developed by Biogents (Kröckel et al. 2006). The BG-Sentinel attracts adult mosquitoes with visual cues that can be combined with olfactory lures (e.g. CO₂, BG-Lure®). The trap is essentially a collapsible container with a white lid and a black entrance funnel in the middle. Inside there is a small electrical fan that sucks air through the trap and draws any approaching mosquitoes into a catch bag.

Target species and physiological states: Captures adult *Aedes* mosquitoes of both sexes and all physiological states.

Entomological surveillance indicators: Adult vector occurrence and density.

Advantage: The BGS trap is collapsible and lightweight, highly effective and not labour intensive to use in the field.

Disadvantage: This trap needs a 12V battery or mains power to operate. Initial trap cost is high. Captured mosquitoes will degrade after a couple of days, and it catches many other insects which can require significant time to sorted through to find the mosquitoes of interest.

Sample period: Can be deployed for up to one week, depending on power supply used – if a battery is used, the deployment time will be shorter as it uses ~10-11 Ah/day.

Data: Total number of adult mosquitoes per sampling effort (by species and sex).

Materials

- | | |
|-----------------------------------------------------------|--------------------------------------------------------------------|
| <input type="checkbox"/> BG-Sentinel trap | <input type="checkbox"/> Pencils/pens/markers |
| <input type="checkbox"/> Entrance funnel | <input type="checkbox"/> Labels |
| <input type="checkbox"/> Entrance funnel lid | <input type="checkbox"/> Data device (phone or tablet) |
| <input type="checkbox"/> Entrance funnel net | <input type="checkbox"/> CO ₂ tank (optional) |
| <input type="checkbox"/> Trap body | <input type="checkbox"/> CO ₂ emitter nozzle (optional) |
| <input type="checkbox"/> Catch bag | <input type="checkbox"/> Dry ice in container (optional) |
| <input type="checkbox"/> Trap cover | <input type="checkbox"/> 12 v battery (optional) |
| <input type="checkbox"/> Inner cylinder with fan attached | <input type="checkbox"/> Battery cable or power cord |
| <input type="checkbox"/> Catch bag storage container | <input type="checkbox"/> BG-Lure cartridge (optional) |

Trap preparation

The smell of new traps might repel mosquitoes. Therefore, place new traps outside for two weeks before using them for surveillance to allow the smell to disappear.

Trap assembly and connection to power

(These instructions are based on the Biogents manual. To review their instructions see https://www.bg-sentinel.com/downloads/BG_Sentinel_2_Manual_EN_web.pdf)

1. Remove trap components from bag.



2. Unhook the eyelet on the carrying handle to open trap body.



3. Insert the entrance funnel lid into the entrance funnel. If performed correctly, the lid fits inside the entrance funnel without being forced and smoothly swings shut. Do not force the lid as it will break.

a. Note that the entrance funnel has a top end with two small holes and a bottom end with a protruding ring around it.

Entrance funnel

Holes for lid insertion



Ring for hanging catch bag

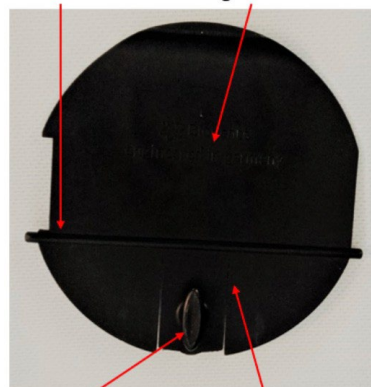
b. Note that the entrance funnel lid has a top side with a black handle.

c. Also note that the entrance funnel lid pivots on a bar. This bar isn't in the centre of the lid and therefore there is a larger section and a shorter section.

Entrance funnel lid top

Pivot bar

Larger section



Black handle

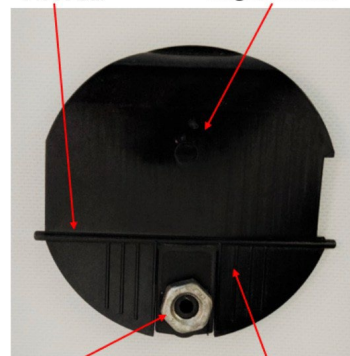
Shorter section

d. Note that the entrance funnel lid has a bottom side with a silver nut.

Entrance funnel lid bottom

Pivot bar

Larger section



Silver nut

Shorter section

e. Hold the larger section of the entrance funnel lid and push the lid through the bottom opening of the entrance funnel.



f. Insert both bar ends into the holes on the top of the entrance funnel.



g. Remove hand and check that the entrance funnel lid smoothly swings shut



4. Attach the catch bag over the protruding ring of the entrance funnel. Tighten the bag's draw-string. When performing this step, check the catch bag thoroughly to ensure that it isn't damaged. Also ensure that the rough stitched side is on the outside as this will make it easier to remove the mosquitoes caught inside the bag.

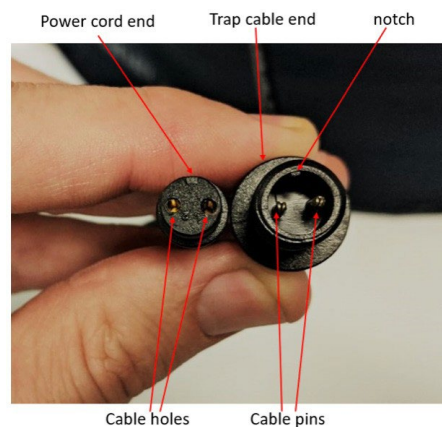


5. Twist the entrance funnel, with the attached catch bag, into the large hole in the centre of the cover.



6. Connect the trap cable end to battery cable or power cord end.

- a. Note the notch and two pins on the trap cable end and how they align with the holes in the power cord/battery cable end.



- b. Ensure you always connect with the arrows in one line and screw on the thread cap to secure this connection.

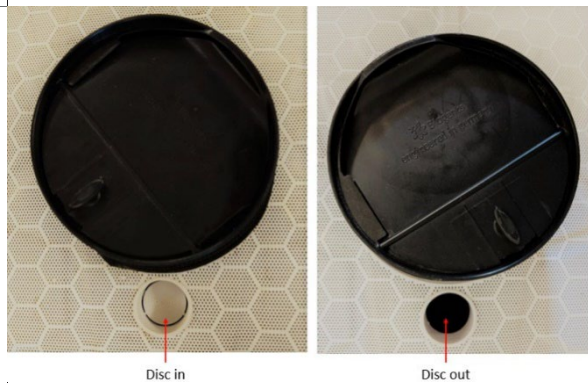


- 7. When powered, the fan can be heard and the lid will tilt open. When turned off, the lid closes ensuring that mosquitoes cannot escape.



- 8. If desired, you can use the BG-Lure cartridge:

- a. Unwrap the plastic label from the cartridge.
- b. Push out the white Biogents disc from the small hole in the trap cover next to the entrance funnel hole.
 - i. Insert the cartridge into this small hole.



9. If desired, you can place the battery inside the body of the trap. To do this:

- a. First open the trap by unhooking the clips of the cover and remove the cover.
- b. Place the battery into the fixed straps located on the bottom of the trap body and tighten the straps.
- c. Connect the battery cable to the battery and guide the other end of the cable out of the opening on the side of the trap.
- d. Connect the open ends of the battery cable with the ventilator cable to power on the trap. You can easily disconnect and connect the cables to turn the trap off or on without having to open the trap body..

10. If desired, attach a CO₂ source to a CO₂ emitter nozzle (purchased from Biogents). For detailed instructions on different sources of CO₂ and how to connect them to the BG-Sentinel see the information sheet provided by Biogents, linked above.

11. Note that BGS traps can be deployed then serviced weekly with mains power, overnight with a motorbike battery and up to 4 days with average car batteries (requiring ~11 AH/day).

12. While catches of *Ae. albopictus* and *Ae. aegypti* are generally increased when baits such as the BG-Lure and CO₂ are used, the trap will still catch these species without any bait, indicating that potentially these mosquitoes are attracted to the black trap for other reasons such as for resting.

Trap location selection

1. Talk with the householders about the location to place the trap. Ensure that 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 that the household likes, you should thank the household but find another property on which to place a trap.
2. When operating the trap always ensure that there is nothing within 50 cm above the trap cover.
3. Ensure the trap is placed in a location without hazards (electrical concerns, trip hazard, aggressive dog) nearby to the occupants or staff servicing it.
4. Discuss permission to service the trap if the occupant will not be at 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. Ensure the occupant will not need to use the power socket dedicated to the BGS trap. If they may need the power socket, then provide a double-adaptor to ensure that the trap will continue to run.
7. 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 substance like petroleum jelly or vaseline around the entrance funnel to prevent ants from entering the trap. If such products are not available, consider hanging the BG-Sentinel trap 5 cm above the ground.

Trap location selection (continued)

8. The specific location where the BG-Sentinel trap 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. If using CO₂, ensure that the trap is not placed within 1 m of structures like walls or fences.
 - e. Place the trap near areas likely to contain productive larval habitats.
 - f. Place the trap near areas likely to be favourable mosquito resting locations (relatively dark or cool places which may include heavily shaded or bushy yards).
 - g. Place the trap near areas likely to be used by people, for example areas will gather and sit.

***FOR FURTHER READING regarding environmental influences on BGS traps see the Biogents BG-Sentinel manual or Staunton et al. 2019, 2020.**

Servicing the trap

1. Check that the trap fan is still working. If the fan has stopped, note that the trap has stopped working.

2. Label the catch. Note trap, location and date on a small piece of paper using a pencil and place the paper into the entrance funnel top opening while the fan is working so that the label falls into the catch bag.

3. Remove the catch bag.
Do not turn the trap off.

a. Undo the mechanism on the catch bag draw-string to unhook the catch bag from the entrance funnel ring. The suction should continue to keep the mosquitoes inside the catch bag.



b. Place the entrance funnel to the side keeping the catch bag hanging inside the trap above the fan.



c. Pull the draw string closed. This should be done smoothly so that the suction from the fan keeps the mosquitoes inside the catch bag and they do not escape.



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4. **Wrap and knot the drawstring around the top of the catch bag to ensure it doesn't open.**

 5. **Place the catch bag in a dedicated container, ensuring that nothing heavy is placed on it.**

 6. **Temporarily store the mosquitoes in labelled catch bags until processing and long-term storage. For further details see [SOP# MOS-2021](#).**

 7. **If the trap is to remain in place simply replace the catch bag and battery, if used.**

 8. **If the trap is to be moved then collapse the trap by placing the hook back through the eyelet, gather the power cord in a tidy manner and ensure you remove all of the components.**
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Videos

To watch videos of how to assemble and deploy the BG-Sentinel trap go to:

- Biogents Tiger Mosquito Monitoring in Urban Areas - the BG-Sentinel in use - <https://youtu.be/Y-1eNOvwckw>
- PacMOSSI How to assemble and deploy a BG-Sentinel mosquito trap - <https://youtu.be/2DugaE142kM>



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 BG-Sentinel traps may include:

- Mosquito transmitted infections
- Battery hazards
- Trip hazards
- Dogs

For further details on safety and risk assessments see [SOP# MOS-2021](#).

References

Biogents BG-Sentinel version 2 user manual

https://www.bg-sentinel.com/downloads/BG_Sentinel_2_Manual_EN_web.pdf

Kröckel U, Rose A, Eiras ÁE, Geier M. (2006) 'New tools for surveillance of adult yellow fever mosquitoes: Comparison of trap catches with human landing rates in an urban environment.' *Journal of the American Mosquito Control Association*.

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<https://doi.org/10.1093/jme/tjz018>

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This Standard Operating Procedure may be used for training and reference purposes. Users are responsible for ensuring any edits to this document are produced and approved in accordance with all relevant legal and ethical requirements governing the surveillance operation.