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🌐 Standard Operating Procedure for Passive Bioaerosol Collection in the Field: Cheesecloth Windbreak

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We use this protocol and it's working

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Abstract

This protocol details the capture of bioaerosols for analyses and bacteria recovery and isolation using a cheesecloth windbreak at field sampling sites.

Guidelines

APPENDIX A: PREPARATION OF CHEESECLOTH PIECES

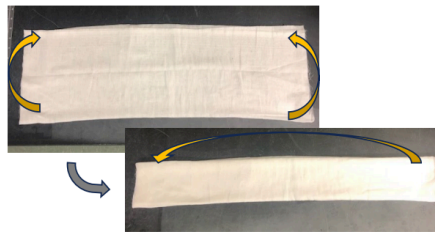
To make sterile cheesecloth pieces for passive air sampling, cut cheesecloth with one yard length and fold it, wrap in aluminum foil such that it completely covers the cheesecloth piece, and autoclave to sterilize.



A-1. Measure cheesecloth (one yard).



A-2. Cut a cheesecloth piece.



A-3. Bring bottom corners to top corners to fold in half and fold in half horizontally as shown next picture.



A-4. Fold in half horizontally.



A-5. Roll/fold the piece from closed end.



A-6. Wrap the cheesecloth with aluminum foil for sterilization by autoclave (per individual organization's protocol).






A-7. Final sterilized cheese cloth.

Materials

EQUIPMENT AND SUPPLIES FOR BIOAEROSOL COLLECTION IN THE FIELD

Note

Disclaimer: Names of vendors or manufacturers are provided as examples of suitable product sources; inclusion does not imply endorsement by the SOP authors. Alternative products may be used if they provide equivalent performance to the items cited in this SOP.

- a. Wooden garden stakes (4 in. x 1.5 in. x 0.5 in. or similar size) from a home center which come in a bundle of 50 stakes (~\$35/bnd). *The 4-foot length is a perfect length when pounding about 6-10 inches of the stake into the ground.
- b.  Lions Services Inc CHEESECLOTH GRADE90 2PLY 50YDS **Fisher Scientific Catalog #50-395-11** . See **section Appendix A** for how to prepare sterile cheese cloth pieces.
- c.  Electron Microscopy Sciences Aluminum Foil Squares, 8 × 8, 0.0015 thick **Fisher Scientific Catalog #50-189-9219**
- d. Tape measure
- e. Mallet or Hammer to place wooden stakes into ground
- f. Nitrile or latex disposable gloves
- g. Permanent marker
- h. Staple gun (1/4-in. staples) or super glue
- i. Spray bottle of 70% ethanol (to field-disinfect scissors)
- j. Paper towels
- k. A pair of Scissors
- l.  Nasco Whirl-Pak™ Write-On Homogenizer Blender Filter Bags **Fisher Scientific Catalog #01-812-5**
- m. Cooler box or other suitable container for keeping cheesecloth samples chilled after collection and during transport to laboratory.
- n. Ice packs
- o. Heavy duty tape (Gorilla Tape or equivalent since will be used to seal cooler for shipment and will need to withstand rough treatment)
- p. UPS or FedEx Shipping label(s) for Next Day Delivery, if shipping
- q. Trash bag or biohazard bag depending on individual laboratory guidelines.

Troubleshooting



SCOPE AND APPLICABILITY

- 1 This standard operating procedure (SOP) details the capture of bioaerosols (*e.g.*, bacteria associated with airborne dust particulates) for subsequent analyses and bacteria recovery and isolation using a sterile cheesecloth windbreak deployed at field sampling sites.
- 2 This method of bioaerosol collection has been successfully utilized in a recent, multi-year environmental microbiology study located in the desert southwestern part of the United States ([Southwest Agricultural Region Environmental Microbiology Study \(2019 – 2024\) | FDA](#)).

SUMMARY OF METHOD

- 3 Using a piece of sterile cheese cloth and wooden stakes, bioaerosols are collected passively at the sampling site to capture viable bacterial cells.

HEALTH AND SAFETY WARNINGS

- 4 Clean disposable gloves should be worn during all steps of this sample collection procedure including cheesecloth deployment and collection to prevent possible contamination of sampling apparatuses and samples.
- 5 Please consult safety protocols developed for your specific organization for exact requirements in terms of precautions and personal protection equipment (PPE).

CHEESECLOTH WINDBREAK SET-UP AND SHIPPING PROCEDURE

- 6 The best placement to prevent tampering with setup will be on privately owned land under consultation with owner to avoid blocking areas of egress in areas along fence lines, field borders, ranch boundaries, etc. Care should be taken to consider current and future wind direction using meteorological data to ensure winds will pass through the cheesecloth material. If possible, collection should take place for a minimum 12 hours. The locations, time of day, frequency, and duration of sampling should be planned ahead based on study objectives.
- 7 Don a new pair of disposable gloves.

- 8 Use a hammer to pound the stake into the ground. Mark the spacing distance (around 28-30 inches apart from each other) with a permanent marker on a different stake and then use it as a template distance to set the spacing of all the sites; it can make deployment more efficient rather than using a tape measure at each location.
- 9 Attach a piece of sterile cheesecloth piece to the wooden stakes using a staple gun (1/4-inch staples), about 3-4 staples on each stake. Stretch the cheese cloth tightly between the stakes (see Figure 1). If staples are not able to be used, consider using super glue to attach the cheesecloth to the wooden stakes.



Figure 1. Picture of the field deployed cheesecloth windbreak

- 10 If possible, before leaving the site, make note of the ground that the air sampler is deployed at, and look for footprints. When returning to the site to collect the sample, one



might be able to tell if someone had tampered with the set up during the deployment timeframe.

- 11 To remove the cheesecloth, don a new pair of disposable gloves and using alcohol-sterilized scissors (wiping off alcohol with paper towels) cut the cheesecloth from each stake, being careful not to touch the wood. If appropriate, pull off cheese cloth from stakes and remove staples carefully. Using a partner to hold the cheesecloth on the edges while the second person makes the cuts is advisable. Carefully fold the cheesecloth into a square that will fit within a large, pre-labeled Whirl-pak™ bag. The label should include Sample ID, set up date and time, retrieval date and time, and your initials. Two wooden stakes with a small amount of cheesecloth stapled to each will be leftover. The stakes will be removed when finished and discarded. Do not re-use the wooden stakes; discard them appropriately after use. Gently place cheesecloth samples in a chilled cooler (with ice packs) or in a refrigerator until shipment or processing.
- 12 Dispose of trash (gloves, stakes, paper towels etc.) in trash or biohazard bag as per individual organization or onsite guidelines.