

Field Extraction of Volatiles with Solid Phase Microextraction (SPME)

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Safety Risks: Minimal

The air pumps make a loud noise and lithium ion batteries require care when handling. Roses have sharp prickles, wear gloves to protect from scratches. Hearing protection is recommended. There may be a risk of electric shock in rainy conditions. Wear appropriate protection from the sun: sunscreen and water are recommended.

Equipment:

Clean air system:

- 3 high volume air inflators (24v, 25 CFM) w/ nozzle attachments
- 6-8 lithium ion (24v, 4.0 Ah) power tool batteries (charged)
- 2 variable flow meters with PTFE tubing
- 2 In line Hepa Sanitary Air Filters for 1/4 in tubing (attached to flow meter)
- 2 inline water filter carbon blocks, one micron filtration

Headspace volatile collection equipment:

- GoBeGreen Original Garden Bags - Nylon - One per sample + Backups (precooked in oven at 50 C for 25 hours or more)
- Zip ties - 6 + per each sample, bring a large number
- Heavy duty shears (for cutting zip ties and holes in the bags)
- Bypass pruners (optional, for removing dead canes, allowing better access to rose flowers)
- Blue mini inline filters (for outflow)

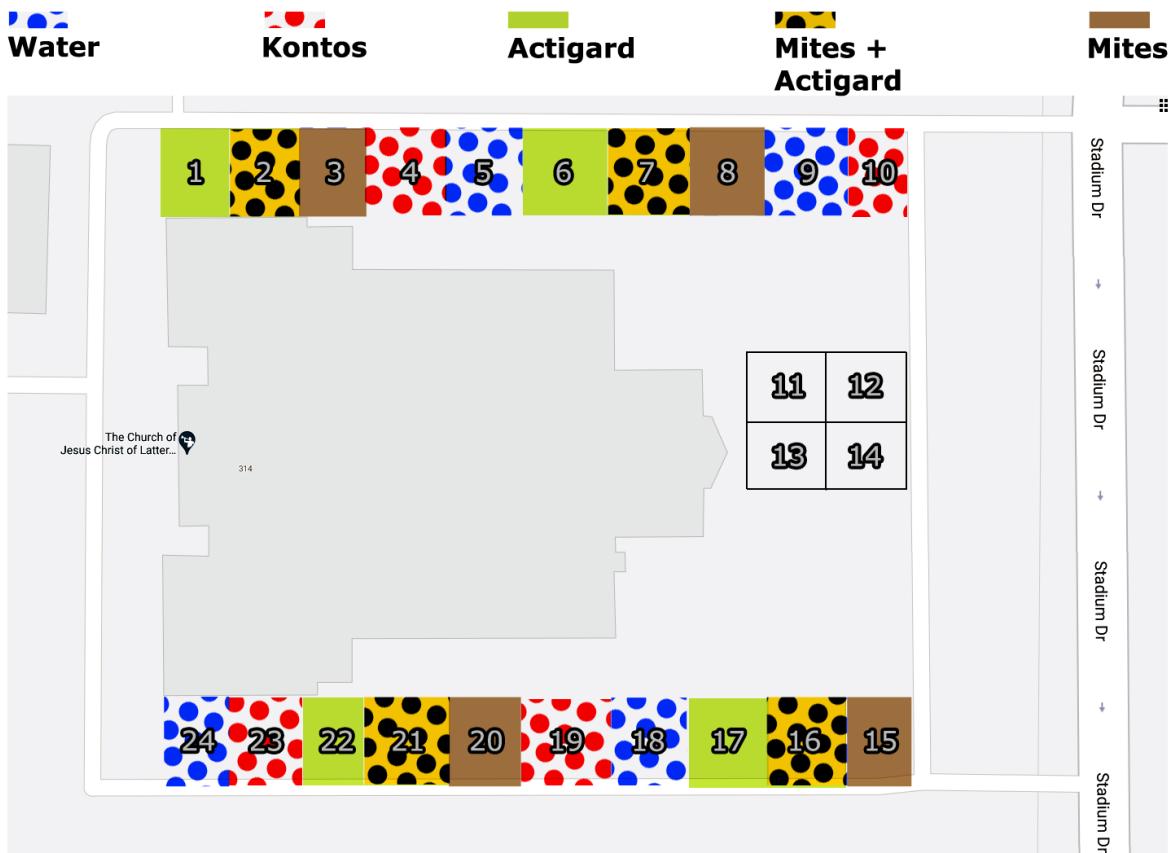
Solid Phase Microextraction (SMPE)

- Manual SPME holder
- SPME fiber (Gray Fiber) - Divinylbenzene/Carboxen/Polydimethylsiloxane (DVB/CAR/PDMS)
- 2 Double Burette clamps
- 2 Aluminum Rod (3 ft, 1/4 in)

Equipment for Internal Standard:

- Nonyl acetate (keep cool)
- 1 Drummond Scientific Aspirator, Captrol III
- 5 ul glass calibrated micropipettes

Experimental Site:



Sample Selection:

For this experiment, we will be collecting headspace volatiles with Solid Phase Microextraction (SPME), a method which adsorbs the volatile organic compounds (VOCs) surrounding part of a plant. It is a flexible method which can collect the VOCs from just about anything you can get an oven bag around. We want to collect the volatiles emanating from roses with various treatments, including:

- roses infested with eriophyid mites (plots: 5, 9, 24, 18)
- roses treated with Acibenzolar-S-methyl (ASM, Actigard) (plots: 1, 6, 22, 17)
- roses afflicted with Rose Rosette Disease (already sampled in Athens, GA)

To begin, select a cluster of flowers from a single rose cane, and gently cover it with an oven bag. Seal the end of the oven bag over the base of the rose cane with a zip tie so that the air is trapped around the

Notes and Figures:



Assembled Field Extractor:

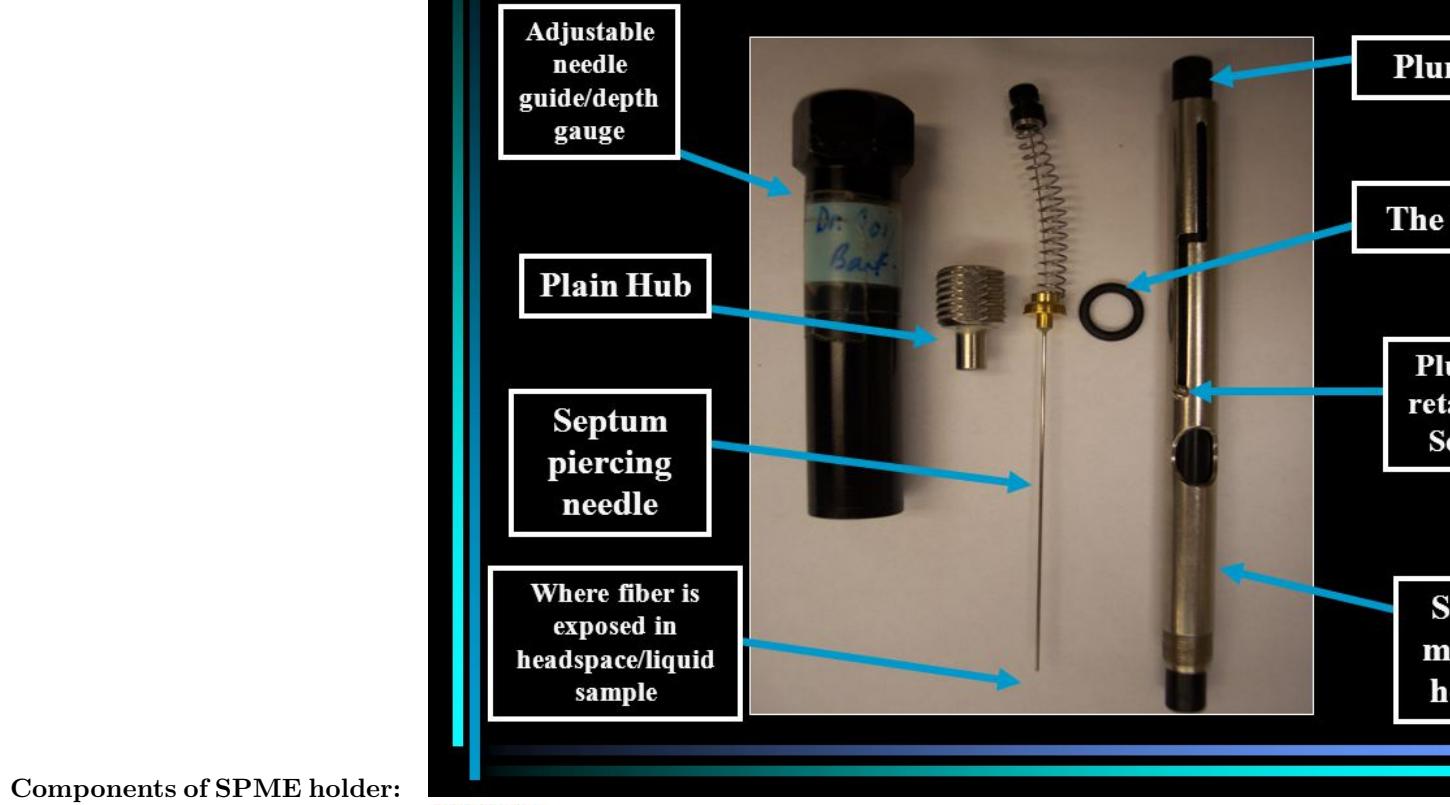
Figure 1: Assembled clean air delivery system for in-field extraction of rose headspace volatiles via SPME



Burette holder

Figure 2: The burette holder can be adjusted to different heights to accommodate the SPME holder in a variety of positions. Note the placement of the hoses and the blue inline filter.

Components of a Manual SPME Holder



Components of SPME holder:

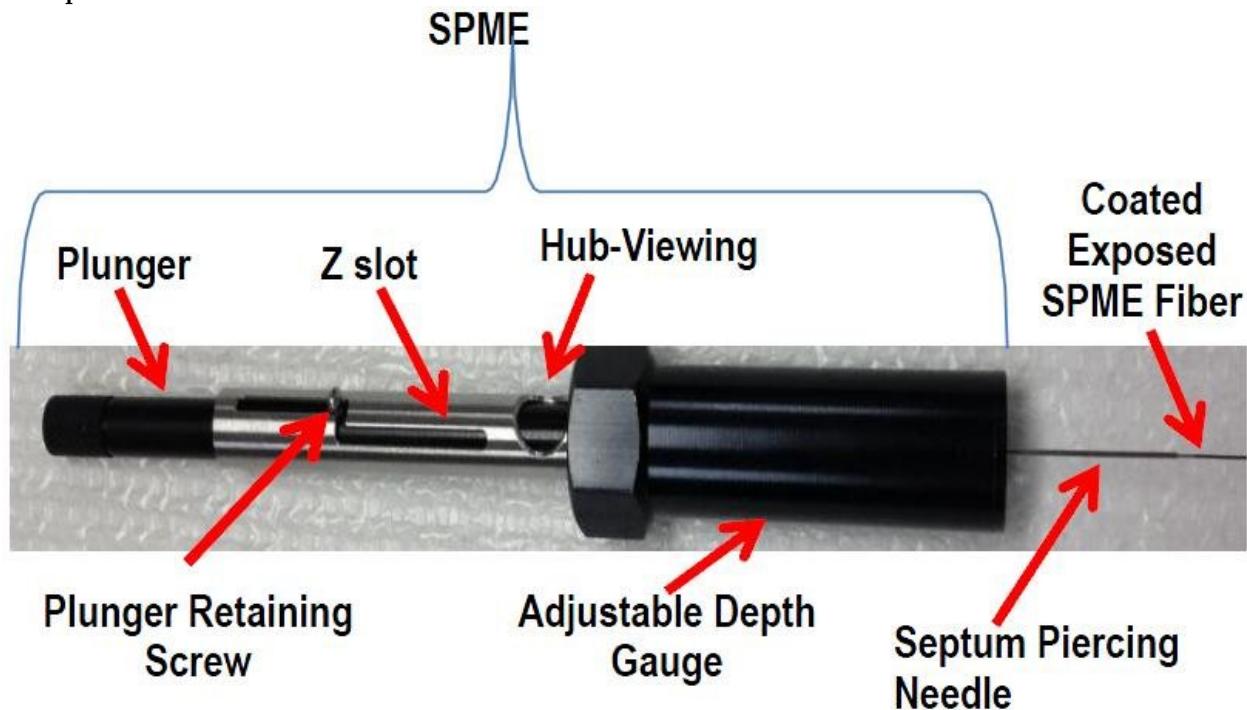
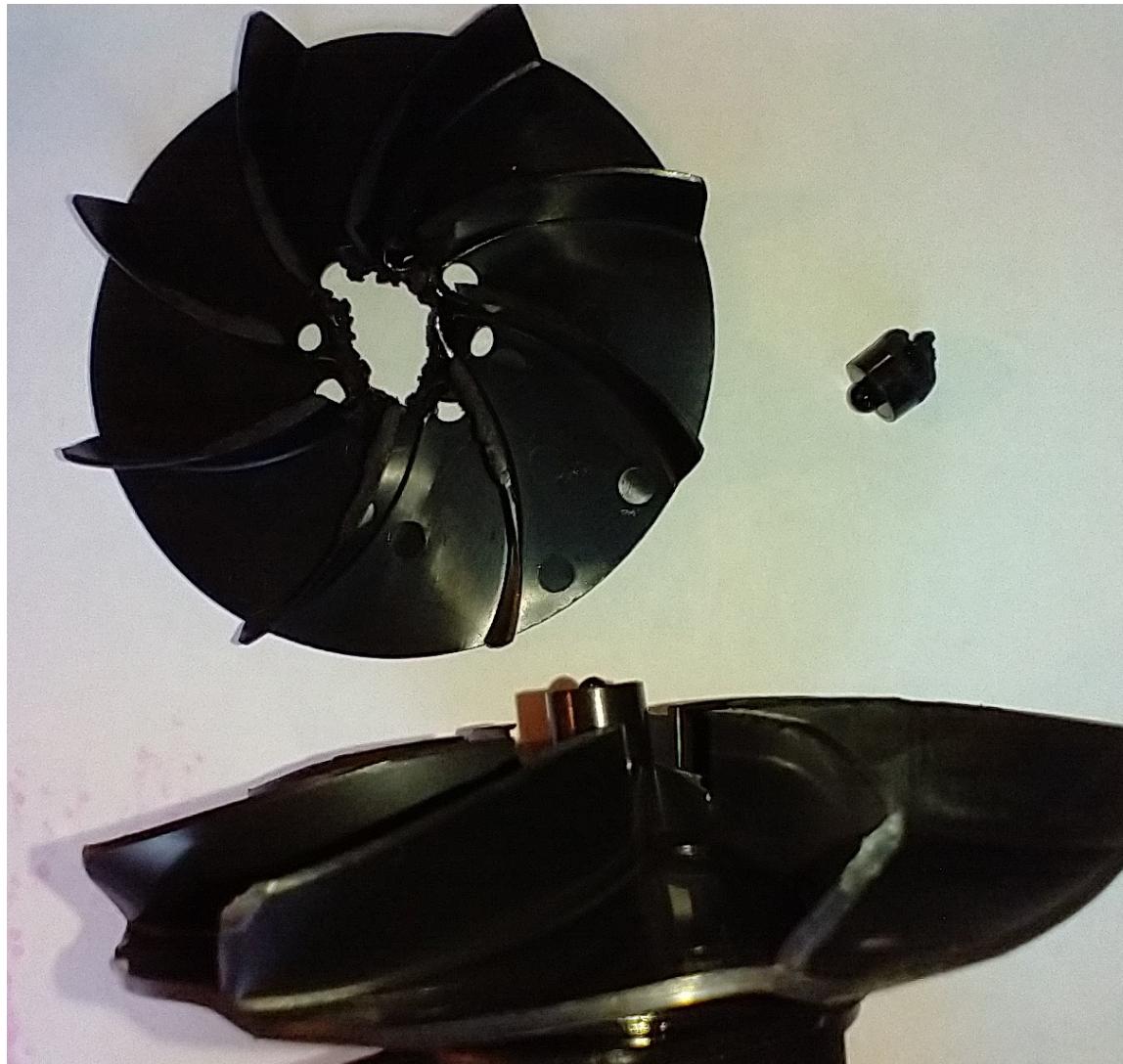


Figure 3: The SPME fibers are really fragile: please protect the needles from bending and make sure that the fibers do not come into contact with the plant during use.



Risks of overheating:

Figure 4: The air pumps will overheat in direct sunlight, especially when ambient temperatures are over 32 C (90 F). To prevent damaging the equipment, try to keep inflators insulated from heat, and in the shade if possible. Take care to avoid obstructing the intake vents. When the air pumps overheat, it melts the internal fans and creates a situation where the motor melts through the internal wiring, completing circuit and preventing the power switch from functioning while the battery is still attached. If you are not able to turn off the air pump with the toggle switch (without removing the battery), then **the air pumps are permanently damaged, and should be replaced immediately.** Also, you will need to remove any particulates of melted fan matter from the carbon block filters (just shake it out).

last modified: 30 June 2021