Impact of Environmental Factors on Floral Scent Emission of *Gelsemium sempervirens*

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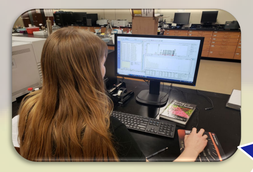
Introduction:

Previous research identified the volatile organic compounds (VOCs) emitted from L and S floral morphs in wild and cultivated populations of *Gelsemium sempervirens*. That study identified environmental factors as a potential source of variation in the data. To determine the impact of these factors, I collected floral scent samples with the SPME (solid phase microextraction) arrow, which enabled me to monitor floral scent *in situ* and directly study the impacts of environmental factors on scent emissions. I collected environmental factors data using LabQuest technology. As there are differences between the floral morphs, I focused only on one plant with L morph flowers to increase sample number per day and minimize genetic variation across different plants. Based on previous work in this area of research, I hypothesized that total VOCs would increase with later time of day, and that higher temperature, lower humidity, and lower barometric pressure would change the distribution of VOCs in these conditions.

Research Question:

Will total amount of VOCs or the distribution of VOCs emitted by flowers change with time of day and weather conditions?

Experimental Methods:



5 Compounds identified and quantified in each sample.

1 Custom sampling apparatus used to hold SPME arrow near flower.

2 DVB-CAR-PDMS SPME Arrow sampled VOCs *in-situ*.

4 SPME Arrow taken to lab for GC-MS Analysis.

3 Environmental factors measured near plant using LabQuest probes.

Results:

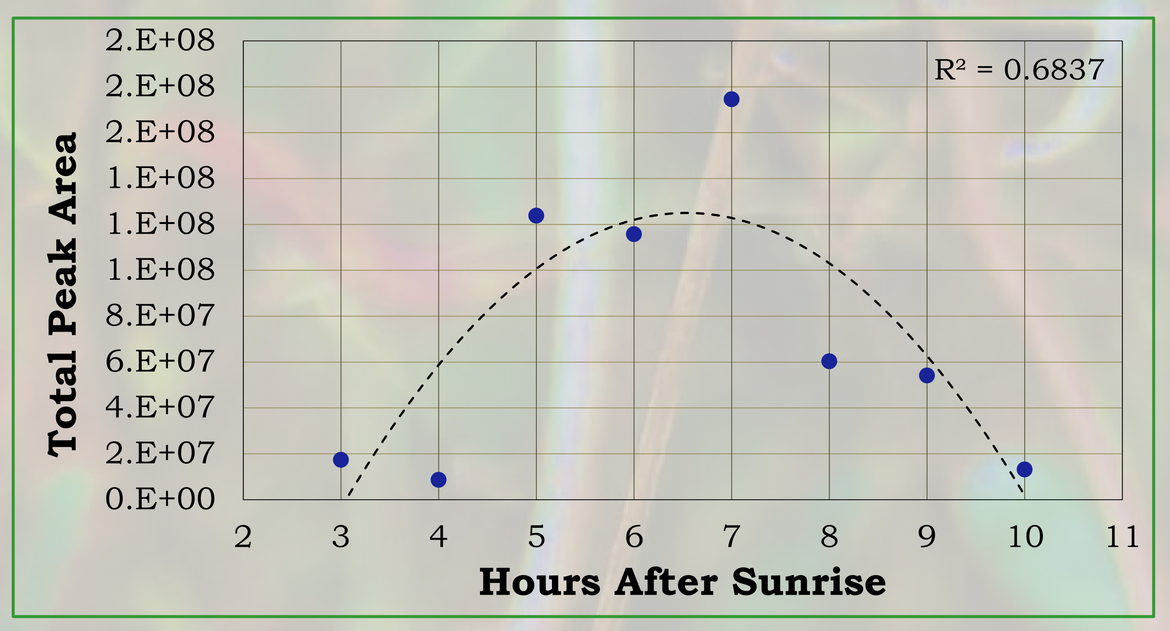


Figure 1. Mean total peak area versus hours after sunrise; polynomial regression line.

Table 1. The 7 most common compounds identified in flowers sampled, identified by comparison of retention times and mass spectral ions with pure standards. Bolded compounds are in all samples.

Retention Time (min)	Compound	Average % Area	Number of Samples (N=21)
9.46	**Benzaldehyde**	**76.50**	**21**
10.84	**Benzyl Alcohol**	**0.82**	**21**
11.54	Acetophenone	1.00	20
14.84	4-Anisaldehyde	8.98	20
16.82	**Alpha Ionone**	**0.33**	**21**
17.62	**Alpha Farnesene**	**0.66**	**21**
21.09	Benzyl Benzoate	4.09	19

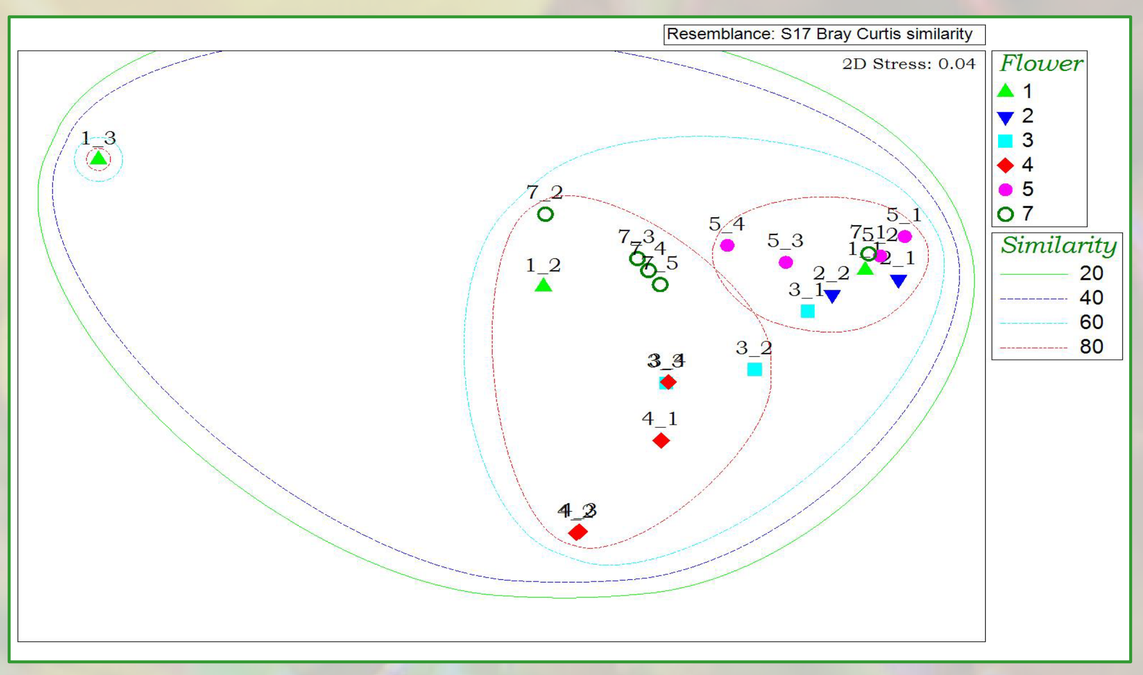


Figure 2. Nonmetric multidimensional scaling (NMDS) analysis of floral scent profile showing three groups using Bray-Curtis similarity indices.

Conclusions:

- Total scent emission appeared to correlate with time of day (Fig. 1), temperature, and relative humidity.
- Floral scent profiles comprised 174 compounds from all 21 samples (average 53 compounds per sample), with 4 compounds common to all samples (bolded Table 1).
- Floral scent profile was strongly correlated to the flower sampled (Pseudo-F=3.5, df=5, P<<0.001; Fig. 2) and not to the time of day (P=0.8) nor temperature (P=0.8).
- Environmental factors such as relative humidity (P=0.12), rain on the day of a sampling (P=0.16), and barometric pressure (P=0.30) may affect floral scent profile, but further analysis is needed to verify this.

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