

Effectiveness of Sansevieria Plants to Purify the VOCs in Air Caused by the Use of Febreze and Diffuser Contaminants

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Abstract

Volatile organic compounds (VOCs) are a danger to every household that has access to chemical products such as air fresheners or select cleaning products. VOCs are dangerous when people are around high concentrations for any extended period. This experiment was conducted to examine the ability of sansevieria plants to filter VOCs added from normal household products. The plants used in this experiment were propagated into smaller pieces in order to fit into capsules. To begin testing, the contaminants were added to the capsules and the VOC levels were measured overtime with the Ion Science Tiger sensor. The basic trend of the measurements for both weeks were not exactly conclusive but did show changes in VOC levels over time.

Objectives

The objective of this experiment was to see how effectively sansevieria plants purify common household VOCs.



Plants in airtight chambers

Results

Figure 1. Febreze VOC averages over weeks 1 and 2.

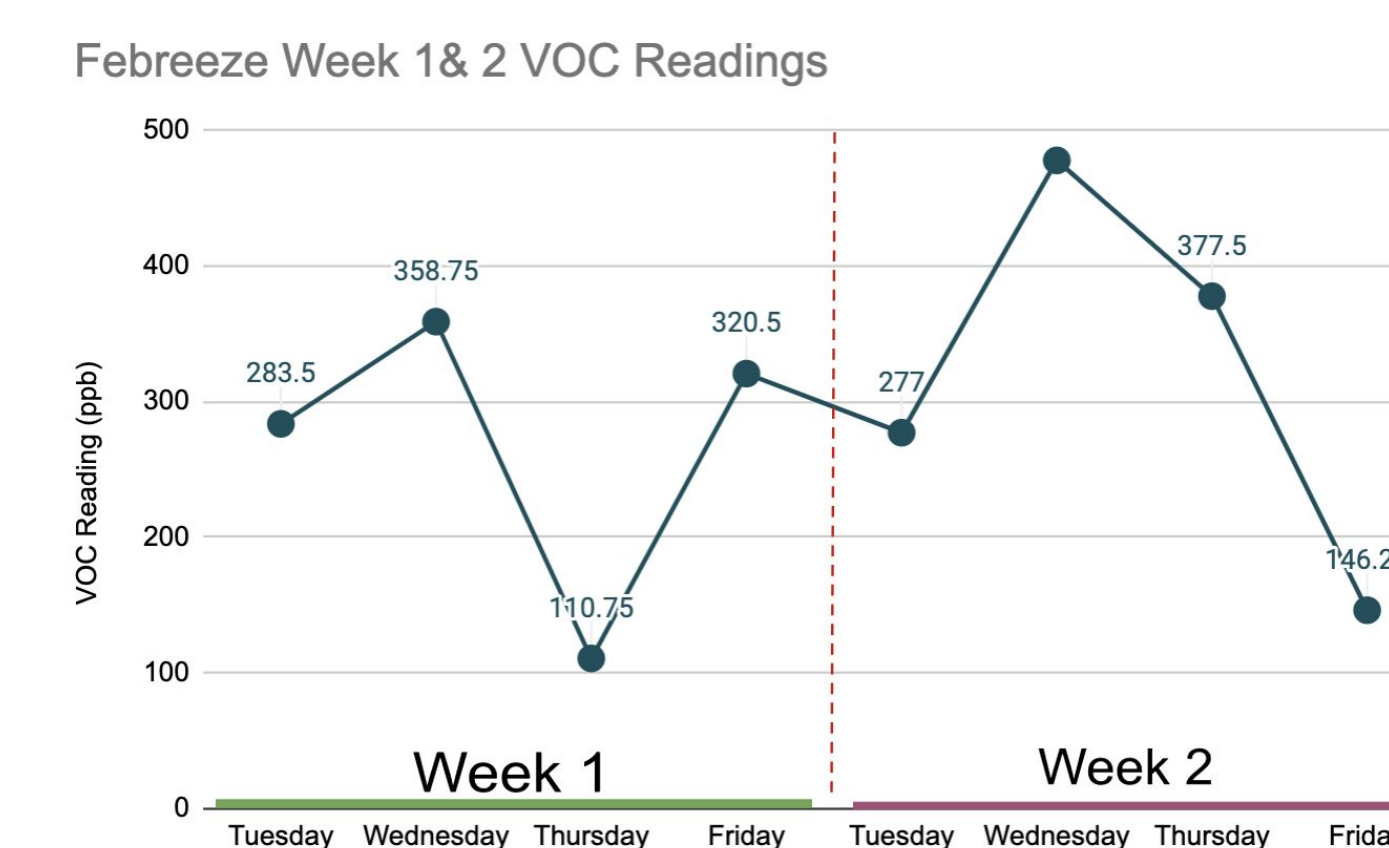
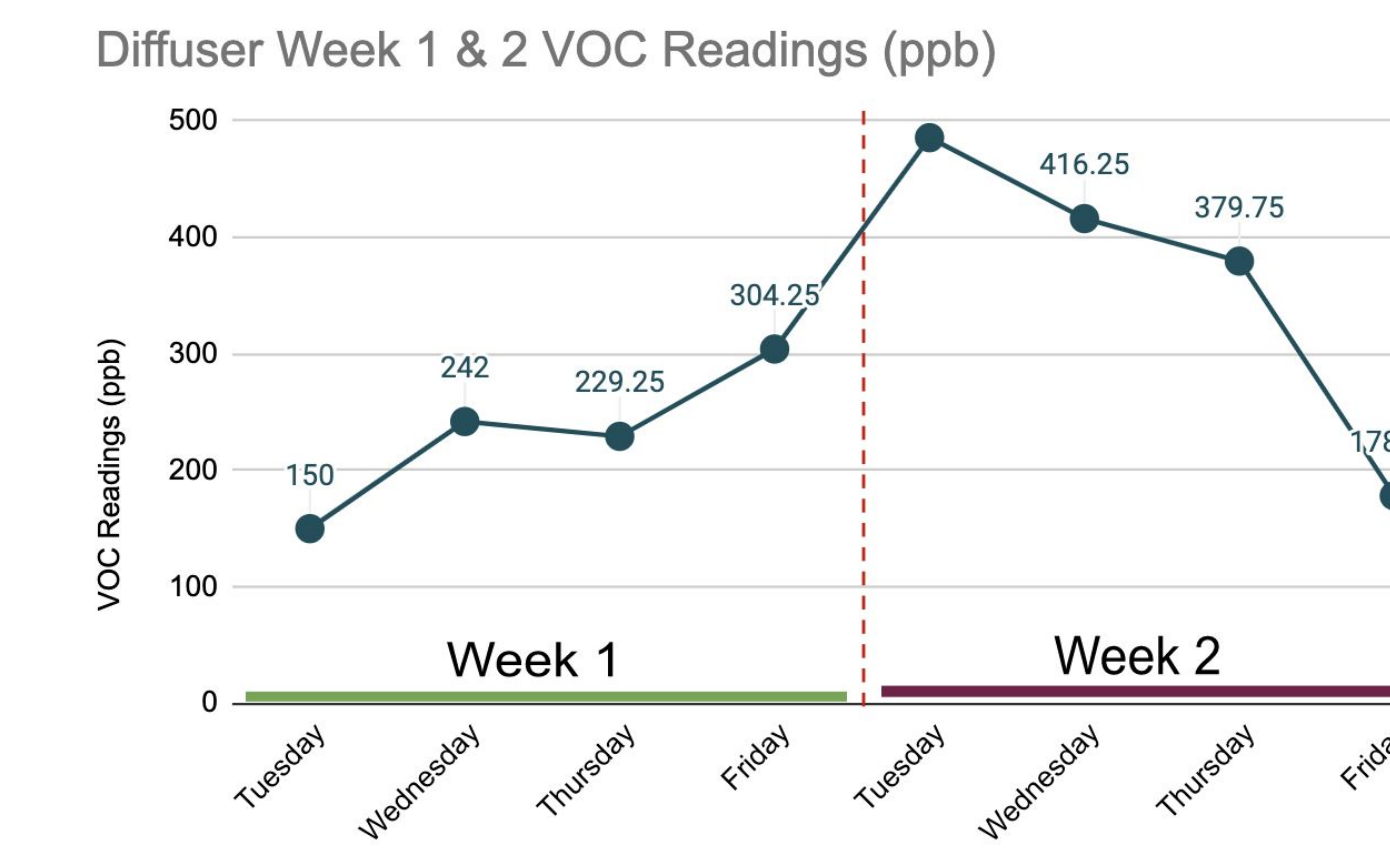


Figure 2. Diffuser VOC averages over weeks 1 and 2.



	Week 1 VOC Readings (ppb)			
	Tuesday	Wednesday	Thursday	Friday
<i>Febreze</i>	294	377	137	335
	292	362	109	318
	287	349	103	315
	261	347	94	314
Average	283.5	358.75	110.75	320.50
Sample Variance	233.67	192.25	344.25	96.33
Median	289.50	355.5	106.00	316.50
Standard Deviation	15.29	13.87	18.55	9.815
<i>Diffuser</i>	214	234	202	317
	160	241	227	308
	118	247	240	298
	108	246	248	294
Average	150	242	229.25	304.25
Sample Variance	2328.0	35.33	404.92	106.92
Median	139.0	243.5	233.50	303.0
Standard Deviation	48.25	5.94	20.12	10.34

Table 1. Week one raw experiment data.

	Week 2 VOC Readings (ppb)			
	Tuesday	Wednesday	Thursday	Friday
<i>Febreze</i>	290	575	390	243
	281	513	350	149
	273	432	410	109
	264	390	360	84
Average	277	477.5	377.5	146.25
Sample Variance	123.33	683.1	758.33	4876.9
Median	277	472.5	375.0	129.0
Standard Deviation	11.11	82.65	27.54	69.83
<i>Diffuser</i>	474	509	410	310
	483	452	397	200
	491	384	367	129
	495	320	345	74
Average	485.75	416.25	379.75	178.25
Sample Variance	86.25	6728.25	860.92	10374.92
Median	487.0	418.0	382.0	164.5
Standard Deviation	9.29	82.03	29.34	101.86

Table 2. Week two raw experiment data.

Figure 1 shows the averages of VOCs present in week one and two for Febreze and Figure 2 shows the averages of VOCs present in week one and two for the diffuser. The data gathered for week one has a few problems but there are explanations for each. The first problem is that the average (Figure 1) VOCs for week one Febreze goes 283.5ppb on Tuesday, 358.75ppb on Wednesday, 110.75ppb on Thursday, and 320.50ppb on Friday. This shows a drop in VOCs on Thursday but a major rise on Wednesday with a subsequent rise on Friday and is likely due to operator error during measurements. Week two shows more clear data that the plant did indeed purify the air in the chamber leading to the VOC count lowering from 477.5ppb to 146.25ppb for Febreze and 416.25ppb to 178.25ppb for the diffuser (Figure 2). The one weird spot however is on Wednesday the Febreze spiked up from 477.5ppb where it was previously at 277ppb on Tuesday. This is probably because a bad reading was taken on Tuesday leading to the odd number on Wednesday. Table 1 shows the standard deviation, median, average and sample variance for week one of the Febreze and diffuser. Table 2 shows the standard deviation, median, average and sample variance for week two of the Febreze and diffuser.

Methods

- Chambers were constructed and initial pollutants were added to chambers to gain baselines and control readings.
- VOC readings were measured over a 20 second time frame by recording the reading every five seconds, these four readings were then averaged to create one VOC reading for that timeframe.
- Plants were added to the chambers and were introduced to pollutants on Tuesdays, after an hour of introduction a VOC reading was taken for each chamber.
- Wednesday through Friday VOC readings were taken to record the level of VOCs that were filtered by the plants as time went on.
- This process was repeated over 2 consecutive weeks.



Repotting Snake Plants



Measuring VOCs



Spraying Febreze



Connecting the Diffuser

Conclusion

Due to the sporadic nature of the measurements taken in the experiment, there are not conclusive results as to whether the plants did or did not filter the VOCs out of the air. However, the general trend of the VOC levels was decreasing throughout week 2. The methods used in this particular experiment could be improved upon in order to gather more accurate data. Improvements such as more organized documentation and more frequent measurements would have made the study more accurate.

Acknowledgements

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