# Annual Comparison of Grass, Tree, and Weed Pollen in Las Vegas From 2015-2018

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## Introduction

Airborne pollen is a significant allergenic trigger and can exacerbate allergic diseases, such as pollen-induced allergic rhinitis and asthma. In Las Vegas, Nevada, information is needed on seasonal pollen trends, which is important for local allergy sufferers and tourists[1,2,3]. The goal of this study is to compare seasonal patterns for grass, tree, and weed pollen in Las Vegas from 2015-2018.

## Methods

Air samples were collected using a Burkard volumetric spore sampler from January 1, 2015, to December 31, 2018, at the National Allergy Bureau site located at the University of Nevada, Las Vegas. The air was drawn into the sampler through an inlet at a rate of 10 liters per minute to impact airborne particles on a Lubrasil coated Melinex tape mounted on a rotating sampler drum. The drum was replaced weekly, and the Melinex tape was divided into seven 48 mm segments, representing the previous seven recorded days. Each tape segment was mounted on a microscope slide with a 10% Gelvatol solution, stained with basic fuchsin, and coverslips were applied. The prepared slides were analyzed by microscopy at 400X magnification to determine airborne pollen concentrations as grains per cubic meter of air. One-way ANOVA and posthoc testing was used to compare annual means of tree, weed, and grass pollen concentrations.

## Results

Monthly mean concentrations of grass and tree pollen were highest in March 2017, with concentrations of 28.00 grains/m$^3$ and 3,848 grains/m$^3$, respectively (Figs. 1-4). Annual weed pollen mean concentrations were significantly higher in 2017 (mean, 89.02 grains/m$^3$). The annual tree pollen mean concentrations showed a decreasing trend from 2015 to 2018 but were not statistically significantly different between the years (P=0.082). Annual weed pollen mean concentrations were significantly higher in 2017 compared with all other years (P<0.001), and grass pollen concentrations were significantly higher in 2017 compared with all other years (p<0.001). Maximum concentrations for grass and weed pollen peaked in 2017 (Table 1). Grass concentrations showed a general increasing trend, with the exception of 2017. Tree concentrations showed an increasing trend across all years, while weed concentrations varied across all years (Table 1).

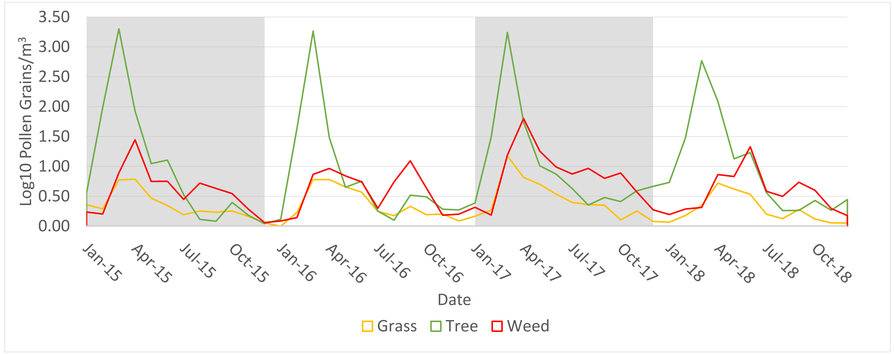


Figure 1. Monthly $Log_{10}$ Averages of Grass, Tree, and Weed Pollen from 2015-2018

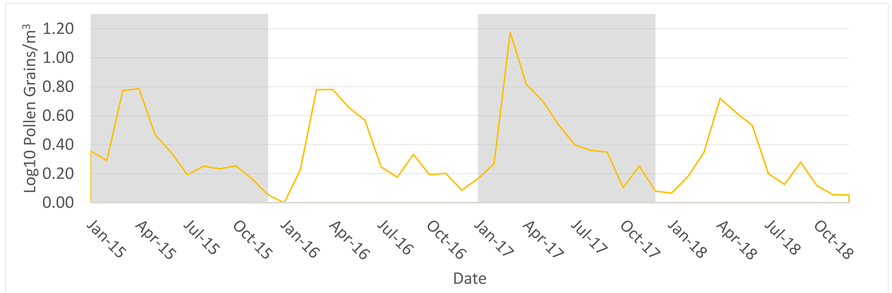


Figure 2. Monthly $Log_{10}$ Averages of Grass Pollen from 2015-2018

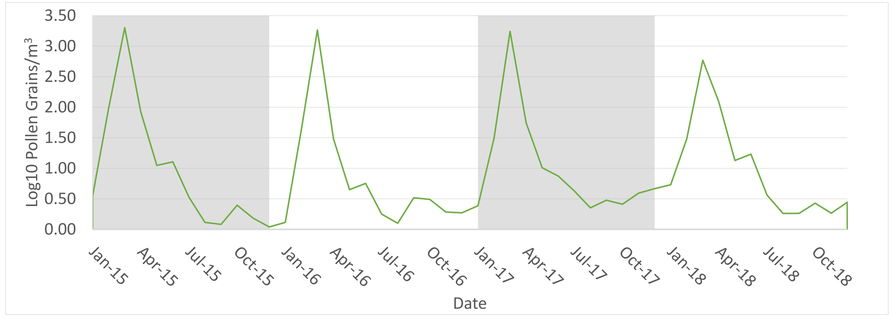


Figure 3. Monthly $Log_{10}$ Averages of Tree Pollen from 2015-2018

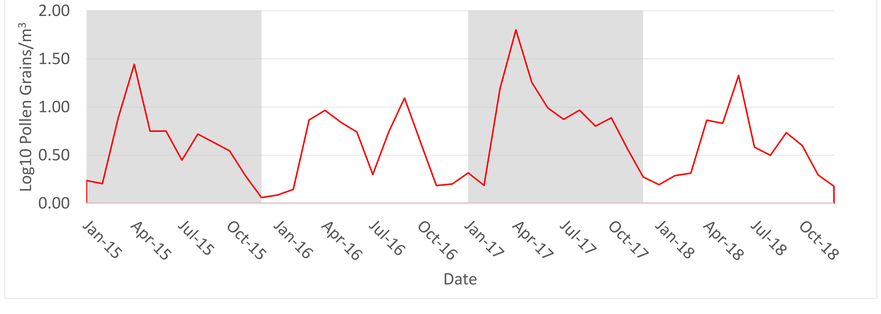


Figure 4. Monthly $Log_{10}$ Averages of Weed Pollen from 2015-2018

| Pollen Type | Year | | | |
|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 |
| Grass | 25.00 | 44.00 | 282.26 | 55.00 |
| Tree | 11,709.00 | 9,586.00 | 16,0450.00 | 18,389.00 |
| Weed | 86.25 | 58.02 | 488.00 | 171.00 |

Table 1. Maximum Grass, Tree, and Weed Pollen Concentrations (grains/m$^3$) from 2015-2018

## Conclusions

Mean pollen concentrations for grass and weed showed an increase in 2017. Maximum grass and weed pollen concentrations also peaked in 2017 compared to other years. Tree mean pollen concentrations showed a decreasing trend across all years. However, maximum tree pollen concentrations showed an increasing trend. The contradiction between mean and maximum concentration trends may be due to increasingly higher concentrations of tree pollen for a short period each year while overall average concentrations decreased. Continued monitoring of annual pollen trends is needed to provide timely forecasts for the community.

## Limitations

Additional variables, such as differences in weather patterns, were not analyzed. Some data points were also missing due to equipment failure. Furthermore, air samples obtained from the one site at the University of Nevada, Las Vegas, may not be representative of the full geographic area of Las Vegas, Nevada.

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