Monitoring Winter Pollen Counts in Central Minnesota



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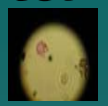

Abstract

The purpose of this investigation was to monitor airborne pollen in Central Minnesota during winter months. This research complements previous studies on summer pollen and completes a full year of data collection for future publication. Collection of pollen samples was performed at Saint John's University, Collegeville, MN on the roof of Peter Engel Science Center. The samples were collected using a Rotorod pollen sampler (10% duty cycle). They were collected every 48 hours from October 2006 to April 2007. Low levels of pollen were observed through the coldest months. Ragweed and juniper were the major grains observed. On nearly 80 % of sample days at least one grain was present. These data support past studies done in the Minneapolis/ St. Paul region (Frenz and Murray, 1997) and Collegeville (Soutar, 2006) and confirm that our winter air nearly always contains pollen of ragweed, juniper and a limited number of other species. These levels are low and unlikely to cause any significant symptoms of hay fever.

Introduction

Previous studies in the Minneapolis / St. Paul (Frenz and Murray 1997) and Collegeville (Soutar, 2006) area suggested an overall low atmospheric pollen concentration. Because of this, we similarly hypothesized that there would be low numbers of grains during winter months. Juniper, ragweed, and scattered alder were observed by Frenz and Murray (1997). Further, pollen was observed on 81 % of the days during their counting period. The longest period of time they went without an observed grain was 48 hours.

Providing relative pollen concentrations over a given unit time has useful implications. Pollen grains can determine what type of plant is flowering at that time and the climatic factors that affect the flowering. Pollen counts are also useful for hay fever diagnosis. Using recorded data it can be possible to discern specific pollen grains causing seasonal allergies.

Objectives

- Become familiar with common Minnesota winter airborne pollen grains
- To confirm previous data collected by Frenz / Murray (1997) Minneapolis/St. Paul, and Soutar (2006) Collegeville, MN.
- Complete a full two year survey of atmospheric pollen counts in central Minnesota.

Materials / Methods

Sample collecting began September 18, 2006 and the last sample recorded in this study was taken April 6, 2007. Samples were taken every 48 hours using a Rotorod sampler operating on a 10% duty cycle on the top of Peter Engel science center, St. John's University, Collegeville, MN, Stearns County (USA). Pollen grains trapped on an adhesive rod were stained with Calberla's solution and the number of grains were counted at 400X. The number of grains per meter cubed observed was calculated. These data were entered into a spreadsheet for graphical analysis.

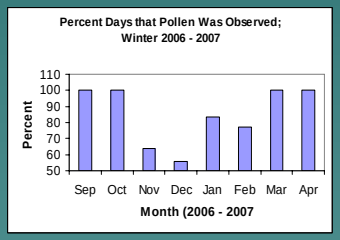

Figure 1

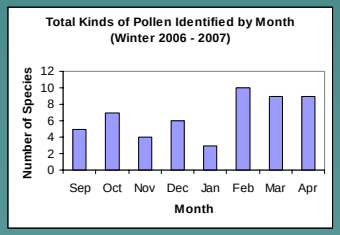

Figure 2

Picture 1: Rotorod Sampler Model 40; Sampling Technologies, Inc.; Minnetonka, MN. USA

Picture 2: Sample collection rod

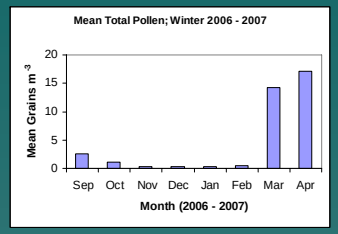

Figure 3

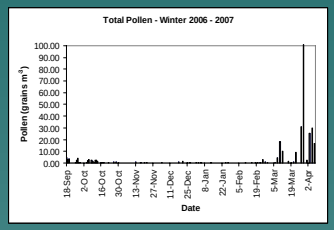

Figure 4

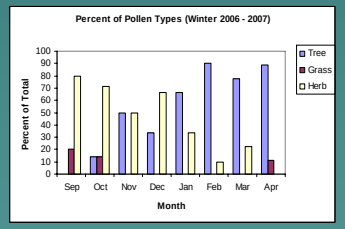

Figure 5

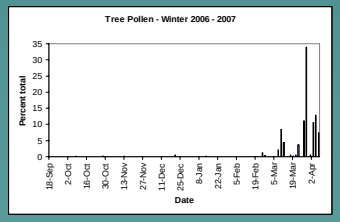

Figure 6

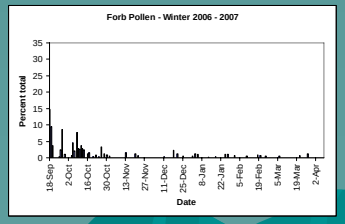

Figure 7

College of Saint Benedict
Saint John's University

Results / Discussion

The winter months of November, December, January and February show a lower pollen concentration (average 4.58 grains m^{-3}) compared to the regular growing season (127 grains m^{-3}). Most days during the winter pollen was observed. The fewest days in which pollen was observed in a sample was December (55.6 %). The number of grains was lowest in December / January (0.37 and 0.36 grains m^{-3}) and did not rise over 15 grains m^{-3} until April. This supports the study by Frenz and Murray (1997) in which grains m^{-3} did not rise above 15 until April 10th (1995). Spring season temperatures can account for this increase of pollen observation. Figure 3 demonstrates an increase in overall pollen grains nearing the spring season. There was decreased variability in the kinds of pollen grains observed in January. Last year's observational work preformed by Andrew Soutar showed a similar peak in pollen production, but two weeks later. Abnormally warm temperature this February can explain the increase in grains we observed (figures 2, 4, and 6). Figure 5 demonstrates the decrease in herb pollen during the winter while tree pollens increase. As forbs end their pollination, trees begin (figure 6 and 7).

References

•Frenz, David A. Murray, Laura W (1997). "An Atmospheric Pollen Survey Conducted During the Winter in Minneapolis, Minnesota, USA." Grana 36: 245-268.

•Soutar, Andrew (2006). "Atmospheric Pollen Survey Conducted During the Winter in Stearns County, Minnesota, USA."