Atmospheric Pollen Survey Conducted During the Winter in Stearns County, Minnesota, USA.

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The purpose of this study was to monitor the concentration of pollen grains that occur in the air during the winter months in Central Minnesota. Although pollen and mold levels during the growing season (May – Sept) have been previously reported for our area (Zenzen, Hoffman, Saupe, 2006), this is the first study of winter pollen counts for our area. Atmospheric samples were collected on a nearly daily basis using a Rotorod Sampler located on the roof of the Peter Engel Science Center, St. John's University Collegeville, Minnesota. The samples were collected between October 11th 2005 and April 16th 2006. The results from the study show that there were very low levels of pollen during the winter (0.131 grains m^{-3}). However, there was a drastic increase (1923%) in pollen on March 1st. These results are similar to a study of winter pollen in Minneapolis and provide an obvious explanation for why those who suffer from hay fever have decreased symptoms during the winter.

Atmospheric pollen counts provide data for the average number of pollen grains per cubic meter. A pollen count is very useful to allergists in identifying allergy seasons and is indicative of symptoms experienced by the population. A low pollen count will only cause individuals extremely sensitive to the allergens to experience symptoms. In contrast a high pollen count is likely to cause most individuals who are sensitive to some degree to experience some kinds of symptoms. This pollen count being the first of its kind during the winter months in Stearns County will give allergists a better of idea of the pollen concentration during the winter season.

The Rotorod sampler is an air sampling device which operates by spinning its' head, which lowers the pollen collecting rods. The Rotorod operates on Duty Cycles which in this case lasts 10 minutes. For this procedure we used a 10% Duty Cycle which means that the Rotorod spins it's head and lowers the pollen collecting rods 10% of the duty cycle which is 10 minutes, therefore it spins for one minute and rests for nine.

Fifty-one atmospheric air samples were collected with the Rotorod sampler between October 21st, 2005 and April 16th, 2006. The Rotorod sampler was set to a 10% Duty Cycle. After removal from the Rotorod, the rods were stored in sealed vials at room temperature. To count each sample, the rod was placed in the deepest groove of a stage adapter then a few drops of Calberla's stain were added to the sample rods. A standard 22x22 mm coverslip was placed on the rod and the entire area under the coverslip was analyzed under a light microscope at 400X magnification. The pollen was counted using "long" swipes, which means they were counted by moving the microscope stage horizontally along the length of the rod. The type and number of pollen grains on each rod were counted and recorded. The pollen data was converted to the expression grains/m^3 based on the amount of time the rod was in the Rotorod sampler.

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr
No. of samples	2	17	8	6	2	12	4
Alder	0	0	0	0	0	1	25
Birch/Ironwood/Hazelnut	0	0	0	0	0	0	6
Cedar/Juniper/Cypress	0	1	0	0	0	35	88
Elm	0	0	0	0	0	12	432
Maple/Boxelder	0	0	0	0	0	11	23
Oak	0	0	0	0	0	1	2
Pine	0	0	2	0	0	1	6
Poplar/Cottonwood/Aspen	0	0	0	0	0	2	1
Willow	0	1	0	0	0	12	6
Grass	1	5	0	0	0	7	15
Sedge	0	3	1	0	0	1	0
Amaranth/Pigweed	0	2	0	0	0	3	0
Nettle	0	0	1	0	0	2	0
Plantain	0	0	2	0	0	0	0
Ragweed	3	2	1	0	0	0	0
Sagebrush	1	1	0	0	0	3	0
Sorrel/Dock	0	0	0	0	0	0	1

Table 1. Number of grains of each pollen type recovered by month.

Key
Brown – Tree Pollen
Green – Grass Pollen
Yellow – Weed pollen

The results clearly show a decreased pollen concentration during the winter. The concentration during the winter season (December 21st – March 21st) was 0.12 grains/m^3, which is small in contrast to the concentration from March 21st to April 16th which was 22.55 grains/m^3. These results mirror an earlier pollen survey conducted in Minneapolis and the results can be deemed as predictable due to the low incidence of hay fever during winter; however the importance of this study lies in the pollen counts before and after winter. From this data we can identify the types of pollen which are found in the air before the winter season and the types which circulate in the air after winter. The pollen concentration from October 24th – December 20th was 0.17 grains/$m^{3,}$ which is low however most of these pollen grains where of weed origin specifically the ragweed family. According to table 1, 6 grains of ragweed were found during the aforementioned time period. Though the concentration was minimal, there are multiple antigens in ragweed pollen (Jelks 1987) making them highly allergenic and a threat to highly sensitive individuals for most of the year. After the winter season, the pollen count from March 22nd – April 16th was 22.55 grains/m3, ninety five percent of this pollen was of tree origin, mostly from elm trees. Elm pollen was also the most prevalent pollen type during April in the Minneapolis study. Pollen from elm trees is moderately strongly allergenic (Jelks 1987) and marks the beginning of the spring allergy season in Stearns County.

References

Frenz, David A., and Laura W. Murray. "An Atmospheric Pollen Survey Conducted During the Winter in Minneapolis, Minnesota, USA." Grana 36 (1997): 245-248.

Jelks, Mary, M.D. Allergy Plants that Cause Sneezing and Wheezing. World Wide Printing, Tampa, 1986.