Pollen Analysis of Ambient Air vs Honey and The Challenge of Identifying Pollen Types
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Air Sampling

A – Wind vane
B – 24 hr or 7 day drum
C – Rain shield
D – Intake orifice
E – 10 L/min vacuum pump
Honey Sampling

• Beekeeper submits honey sample.
Analyzing (Air Sample)

Stained Microslide

Compound Microscope
  • Magnification: 400X

Trained Analyst

Olympus BX43
Dr. Bryant refined the analytical protocol, diluting small amounts of honey (10 g) in water and 95% ethanol, then washing in various acids, some very volatile. Then he centrifuged, washed, vortexed, centrifuged, rewashed, treated with more acid, heated and centrifuged one last time. NOTE: Tracer spores (Lycopodium tablet via Sweden) added for recovery/QC.
Identifying

• Aeroallergen courses – AAAAI, A.I.R., Ochsner
• Identification Manuals
  – E. Grant Smith, *Sampling and Identifying Allergenic Pollens and Molds*. 1990
  – Ronald O. Kapp, *How to Know Pollen and Spores*. 1969
Identifying

Pollen morphology

• Size: 20-60 µm (wind-pollinated)
• Shape – elongated, spheroidal, flattened
• Apertures (0-4+) – pores, furrows, pores in furrows
• Exterior – sculpturing
• Interior detail
• Seasonal/Regional
Identifying (Air)

Tree Season (14): February - May
- Juniper, Elm, Maple, Poplar
- Oak, Ash, Mulberry, Birch, Sycamore
- Sweet Gum, Pine, Walnut, Hickory, Willow

Grass Season (1): May – June
- Grass

Weed Season (5): June – October
- Plantain, Ragweed, Chenopod, Nettle, Sage
Identifying (Honey)

There are 250,000+ different plants/flowers just in the United States that can be used by a honey bee.

Common Varieties in Illinois

<table>
<thead>
<tr>
<th>Alfalfa</th>
<th>Sunflower</th>
<th>Basswood</th>
<th>Trefoil</th>
<th>Black Locust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Willow</td>
<td>Blackberry</td>
<td>Butterweed</td>
<td>Dandelion</td>
<td>Goldenrod</td>
</tr>
<tr>
<td>Henbit</td>
<td>Japanese Honeysuckle</td>
<td>Late-flowering Boneset</td>
<td>Purple or Red Deadnettle</td>
<td>Tulip Tree / Yellow Poplar</td>
</tr>
<tr>
<td>Deadnettle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red Bud</td>
<td>Red Clover</td>
<td>Silver <strong>Maple</strong></td>
<td>Smartweed</td>
<td>Soybean</td>
</tr>
<tr>
<td>White Dutch</td>
<td>White Sweet Clover</td>
<td>Wild Mustard</td>
<td>Yellow Rocket</td>
<td>Yellow Sweet Clover</td>
</tr>
<tr>
<td>Clover</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Tree Pollen

- Juniper, Elm, Maple, Poplar, Oak, Ash, Pine, Willow

Images from College of St. Benedict/St. John’s University
www.csbsju.edu/pollen/links/basic_key.htm
Grass Pollen
Weed Pollen

• Plantain, Ragweed, Chenopod, Sage, Nettle
Common Pollen in Illinois

- Alfalfa
- Dandelion
- Red Deadnettle
- White Sweet Clover
- Wild Mustard
Reporting Purpose (Air)

NAB Chart

<table>
<thead>
<tr>
<th>Aeroallergen (per cubic meter)</th>
<th>Tree</th>
<th>Grass</th>
<th>Weed</th>
<th>Mold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1-14</td>
<td>1-4</td>
<td>1-9</td>
<td>1-6499</td>
</tr>
<tr>
<td>Moderate</td>
<td>15-89</td>
<td>5-9</td>
<td>10-49</td>
<td>6500-12999</td>
</tr>
<tr>
<td>High</td>
<td>90-1499</td>
<td>20-199</td>
<td>50-499</td>
<td>13000-49999</td>
</tr>
<tr>
<td>Very High</td>
<td>&gt;1500</td>
<td>&gt;200</td>
<td>&gt;500</td>
<td>&gt;50000</td>
</tr>
</tbody>
</table>

These levels set by National Allergy Bureau correspond to typical allergy symptoms.
Reporting Purpose (Honey)

Pollen content in Honey

• Determine plants harvested by bees
• Accurate labeling of honey (“truth in labeling”)
• Determine origin of honey*
  – Foreign or Domestic
  – Safe or Unsafe

* Processed honey (ultra-filtration) removes nearly all pollen but improves appearance and extends shelf life.
Summary

Honey Analysis for Pollen Count

- Sample Preparation - time / labor
- Training (long-er learning curve)
- Database/References of pollen
- Microscopic Analysis – time, effort
- Expense – chemicals, equipment, etc.
- Limited amount of pollen in honey
Reporting

• Environmental Health Laboratories updates two web pages and a phone hotline each day.

  National Allergy Bureau

  Saint Louis County Health: Pollen and Mold Center
  http://www.stlouisco.com/HealthandWellness/EnvironmentalServices/PollenandMoldCenter

  Saint Louis County Health: Pollen Hotline
  (314) 615-6825
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  www.aaaai.org

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