Ragweed pollen trend in Northern Italy 
(North-West Milan area) and its potential impact on public health

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Background

The North-Western area of the Milan Province has been colonized by *Ambrosia artemisiifolia* since the 1940s


(Bibliographic reference kindly provided by Dott. P. Bottero, Allergy Service Magenta Hospital)
Clinical manifestations of ragweed allergy were frequently observed in allergy clinics located in this area only starting from the middle of the 1980s.

First report of ragweed allergy in Lombardy Region

NOTE DI EPIDEMIOLOGIA

Pollinosi da *Ambrosia artemisifolia*
in provincia di Milano

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M. BRIVIO ***, C. NOVI *, C. ORTOLANI ***
Most recent epidemiological study:

- **14%** of the population sample examined was allergic to ragweed (sample: health care workers, 1373 subjects)

- **increase** of prevalence from **9.2%** in 1996 to **14%** in 2005

- **high percentage** of asthma (more than 40%) in ragweed allergic patients
Aim

• Analyze the data obtained from aerobiological monitoring stations located in three towns in the North-Western Milan area

• Assess the potential impact of ragweed pollen levels on people who live in this area
Materials and Methods

Monitoring stations

- Legnano (L.), the oldest station: in function since 1995
- Rho (R.) and Magenta (M.): in function since 2000
- Ragweed pollens were sampled by a Hirst volumetric trap located on 3 building roof tops
- These stations belong to the Local Health Authority Milan 1 and are connected to the Italian Network Monitoring on Aerobiology (R.I.M.A.®-AIA).
Material and Methods
Counts and analysis

- **Pollen counts**: according to the standard methods of the Italian Aerobiology Association (AIA)

- **Data analysis**
  - Microsoft® Excel and Ministat statistical software release 1.1
  - significance of difference between SPI: nonparametric statistical – Wilcoxon rank sum test (p<0.05 significant)
  - significance of trends: nonparametric statistical – Cox and Stuart test (p<0.05 significant).
Material and Methods

Data analysis

• For each station and for every year:
  – Seasonal Pollen Index (SPI),
  – start and the end of pollen season and its length (Galan et al. 1995)
  – daily maxima
  – number of days exceeding the clinical thresholds (Comtois 1988, Solomon 1984, Déchamp 2003)

• Analyzing period:
  – since 2000 was analyzed in detail
  – since 1995 have been taken into account only for the trend of SPI.
Results - SPI

- **M.: greater SPI than R. and L.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Legnano SPI</th>
<th>Rho SPI</th>
<th>Magenta SPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>7166</td>
<td>7562</td>
<td>6847</td>
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<tr>
<td>2001</td>
<td>4955</td>
<td>3245</td>
<td>3925</td>
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<td>2002</td>
<td>3623</td>
<td>5122</td>
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<td>5034</td>
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<td>7439</td>
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<tr>
<td>2005</td>
<td>4501</td>
<td>4706</td>
<td>5835</td>
</tr>
<tr>
<td>2006</td>
<td>5429</td>
<td>6489</td>
<td>5085</td>
</tr>
<tr>
<td>2007</td>
<td>4909</td>
<td>5675</td>
<td>7139</td>
</tr>
<tr>
<td>2008</td>
<td>4057</td>
<td>4243</td>
<td>6664</td>
</tr>
<tr>
<td>2009</td>
<td>6309</td>
<td>5527</td>
<td>7431</td>
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<tr>
<td>2010</td>
<td>3368</td>
<td>3643</td>
<td>6596</td>
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<tr>
<td>2011</td>
<td>4051</td>
<td>3633</td>
<td>6915</td>
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</tbody>
</table>

**Average**: 4976.3, 5014.8, 6288.3

**Median**: 4932, 4914, 6630

**Wilcoxon nonparametric test**:
- L. vs. R. p=0.8428 → L. and R. are similar;
- M. vs. L∪R p=0.0035 → M. is different from L∪R
Results - SPI

From 1995 to 2011: overall no trend for L. (p=0.6)

- but in detail: increase of SPI up to year 2000
- since 2000:
  - evident decrease in the SPI for L. and R., even if not significant (p=0.3 in both cases);
  - a non significant slight increase in the SPI for M. (p=0.3).
Results – Pollen Season

Start day of the main pollen season ranged:

- Aug. 2\textsuperscript{nd} to Aug. 14\textsuperscript{th} for L.
- Aug. 2\textsuperscript{nd} to Aug. 16\textsuperscript{th} for M.
- Aug. 2\textsuperscript{nd} to Aug. 15\textsuperscript{th} for R.

Last day of the main pollen season ranged:

- Sept. 16\textsuperscript{th} to Oct. 13\textsuperscript{th} for L.,
- Sept. 20\textsuperscript{th} to Oct. 11\textsuperscript{th} for M.
- Sept. 27\textsuperscript{th} to Oct. 11\textsuperscript{th} for R.
Results – Pollen Season

- **Length** of the main pollen season ranged
  - 43 - 72 days for L.
  - 36 - 68 days for M.
  - 46 - 71 days for R.

- A **similar length** of pollen season was observed, although R. showed a **longer main pollen season**, than L. and M.

- **No trend** was observed in the length of the main pollen season (p=0.1 for R. and p=0.7 for both L. and M.).

<table>
<thead>
<tr>
<th>Year</th>
<th>L. length</th>
<th>R. length</th>
<th>M. length</th>
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<tbody>
<tr>
<td>2000</td>
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<td>2011</td>
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</table>

Average | 58,17 | 59,75 | 56,08
Median  | 58,5  | 59,5  | 55

![Pollen Season Length Chart](chart.png)
Results – Daily maxima

- Highest daily maxima:
  - M. 1125 p/m³ in 2007
  - L. 737 p/m³ in 2006
  - R. 585 p/m³ in 2002

- M. : higher daily maxima than R. and L.

- No trend was observed in the level of daily maxima (p= 0.3 in the three cases)

<table>
<thead>
<tr>
<th></th>
<th>L. daily max</th>
<th>M. daily max</th>
<th>R. daily max</th>
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</thead>
<tbody>
<tr>
<td>Average</td>
<td>368</td>
<td>594</td>
<td>381</td>
</tr>
<tr>
<td>Median</td>
<td>309</td>
<td>540</td>
<td>367</td>
</tr>
</tbody>
</table>
• M.: highest number of days exceeding both the two upper clinical thresholds of 50 p/m$^3$ ($1$) (average=30.92 days, median=31.5 days) and of 100 p/m$^3$ ($2$) (average=22.0 days, median=20.5)

• L. and R.: slightly lower number of exceeding days

($1$) Between 10 and 50 grains/m$^3$: almost all patients with a ragweed allergic rhinitis are symptomatic

($2$) >100 grains/m$^3$: invalidity allergic risk (intense pollinosis; 50% of patients show asthma)
Conclusions

- **M.** results the main polluted zone by ragweed in the North West Milan area:
  - greater SPI
  - non significant slight increase in the SPI trend
  - higher daily maxima
  - highest number of days exceeding both the two upper clinical thresholds of 50 p/m$^3$ and 100 p/m$^3$
Conclusions

- The **population** of the North-West Milan area, in particular who live in the M. surroundings, are exposed for many days in the year to ragweed values far above the upper clinical thresholds.

- Parallel the estimated ragweed allergy prevalence is high.

- These findings must be taken into consideration by politicians when making their choices.
Conclusions

- Since 2000, perhaps due to efficiency of prevention measures adopted since 1999, a decrease in the SPI was observed for L. and R.

- Unfortunately, the data were insufficient to demonstrate that there is a statistical significant trend
Conclusions

The attention to ragweed must be kept high and further trials are required in order to monitor its diffusion.
Thanks for your attention!