DATA QUALITY IN AEROBIOLOGY: THE IMPORTANCE OF SAMPLING

Borney M. Francesca, Martinet Nicole, De Lorenzi Daniela - ARPA Valle d’Aosta (Italy)

AIM OF THE STUDY

To investigate critical points of the sampling and to understand their relative contribution to the total uncertainty associated with daily pollen concentration data.

Sampling devices (pollen traps)

Sampling surfaces (adhesive tape)

Position of the sampling devices

Variability of the aspiration flow

Pollen concentration

How pollen grains impact on the monitoring tape (drift effect)

MATERIALS AND METHODS

Steps in aerobiology

Our research

Preparation of the sampling surface

Tape prepared by ourselves in lab (type «A»)

Tape bought already made (type «B»)

Two sampling devices (Hirst volumetric pollen traps «VPPS 2000» or «S1» and «VPPS 2010» or «S2»)

Aerobiological sampling

Position of the sampling devices

same site

different sites (in a 20 km range)

same height

different heights

Data analysis and statistical methods

Coefficients of variation CV% (UNI CEN/TS 16868:2015)

Precision and Accuracy (UNI 11108:2004)

Wilcoxon’s signed rank test

Spearman’s correlation rank test

Sign test

RESULTS

<table>
<thead>
<tr>
<th>Total data</th>
<th>% S1 &lt; S2</th>
<th>% S1 &gt; S2</th>
<th>% S1 ± S2</th>
<th>% data ± CV%</th>
<th>% data ± Precision and Accuracy</th>
<th>Spearman’s correlation test</th>
<th>Wilcoxon’s signed rank test (L&lt;0;U&gt;L)</th>
<th>Sign test ** (1/2L&lt;0;0&lt;1/2U)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same site</td>
<td>221</td>
<td>48,87</td>
<td>48,87</td>
<td>2,26</td>
<td>31</td>
<td>59</td>
<td>0,75 (L=0;U=75)</td>
<td>-0,82* (L=0;U=75)</td>
</tr>
<tr>
<td>Different heights</td>
<td>58</td>
<td>86,21</td>
<td>12,07</td>
<td>1,72</td>
<td>38</td>
<td>48</td>
<td>0,9 (L=0;U=9)</td>
<td>-5,76 (L=0;U=9)</td>
</tr>
<tr>
<td>Different sites</td>
<td>243</td>
<td>18,93</td>
<td>76,13</td>
<td>4,94</td>
<td>28</td>
<td>48</td>
<td>0,49 (L=0;U=49)</td>
<td>10,10 (L=0;U=10)</td>
</tr>
<tr>
<td>Different tapes</td>
<td>192</td>
<td>42,19</td>
<td>53,13</td>
<td>4,69</td>
<td>52</td>
<td>71</td>
<td>0,93 (L=0;U=93)</td>
<td>1,92* (L=0;U=1)</td>
</tr>
<tr>
<td>Different tapes</td>
<td>313</td>
<td>65,81</td>
<td>30,01</td>
<td>4,15</td>
<td>29</td>
<td>62</td>
<td>0,82 (L=0;U=82)</td>
<td>-7,24 (L=0;U=72)</td>
</tr>
</tbody>
</table>

*p < 0,05; NS non-significant; Acceptability -1,96<z<1,96; **No difference if z < 1,84

There is a considerable part of the uncertainty that is not explained by the factors usually taken into account (UNI 11108:2004)

At the same position and tape

POSITION

Same site but different heights

TAPE

S1 tape prepared (A)

S2 tape already made (B)

Different sites in a 20 km range

S1 tape already made (B)

S2 tape prepared (A)

Critical control points:

• Recommendations of UNI 11108: 2004
• Operators suitably trained: – in the preparation of the sampling surfaces and the monitoring slides; – for precision and accuracy in pollen identification and count

CONCLUSIONS

Data variability exceeds the variability associated with the technical steps of the analytical procedure (> 40%)

Importance of the suitability of the sampler location

Influence of the sampling surface (adhesive tape) typology?

part of the uncertainty of the results associated to the sampling?

the part of uncertainty associated to the sampling increases (>50%) when different sites and heights are compared

should be investigated in a deeper way in future

Further detailed studies:

other aspects (e.g. wind speed, wind direction and aerosol aerodynamic characteristics)

single pollen taxa

sampling surface typology

For more details scan the QR Code, or visit the page www.arpa.vda.it

All pictures shown were taken in ARPA Valle d’Aosta laboratories