Modeling phosphate adsorption on a Brazilian Oxisol

C. Pérez1, J. Antelo2, S. Fiol1, R. López1, D. Gondar1, F. Arce1
1Physical-Chemistry Dept. University of Santiago de Compostela. Spain (claudio.perez@rai.usc.es)
2Soil Science and Agricultural Chemistry Dept. University of Santiago de Compostela. Spain

Phosphate bioavailability was assessed in two horizons of a Brazilian Oxisol. It is well known that phosphate ions are strongly adsorbed onto Oxisols, mainly due to high content in iron and aluminum oxide minerals.

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Depth cm</th>
<th>OC %</th>
<th>*FeOx0.8</th>
<th>*FeOx0.8</th>
<th>[P-P04]</th>
<th>Amaxx</th>
<th>pH0.01</th>
<th>pHKd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ap1</td>
<td>0-15</td>
<td>1.5</td>
<td>4813</td>
<td>5295</td>
<td>11.8</td>
<td>10.8</td>
<td>5.5</td>
<td>5.1</td>
</tr>
<tr>
<td>Bw1</td>
<td>136-200</td>
<td>0.5</td>
<td>187</td>
<td>250</td>
<td>4.9</td>
<td>5.3</td>
<td>6.2</td>
<td>6.5</td>
</tr>
</tbody>
</table>

*DCB – dithionite-citrate-bicarbonate extraction; Ox – oxalate extraction

In order to measure the reactive oxide surface area, phosphate desorption has been carried out by adding a 0.5 M NaHCO₃ solution (pH 8.5) to horizons Ap1 and Bw1 of the Brazilian Oxisol, creating different solid-solution ratios (SSR). This extraction method also made it possible to know the reversibly bound phosphate, i.e., the total amount of environmentally available P in soil².

In spite of being a good first approach to describe the adsorption behavior of field samples, further investigations (synchrotron-based techniques, interaction with organic matter...) will be carried out to improve the model.

References