**RESEARCH QUESTION & METHODOLOGY**

What is the potential of recycled bio-based fertilizers as substitute for synthetic P-fertilizers?

**PHOSPHORUS SOLUBILITY**

<table>
<thead>
<tr>
<th></th>
<th>TSP</th>
<th>struvite</th>
<th>FePO$_4$-sludge</th>
<th>digestate</th>
<th>pig manure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total P (g kg$^{-1}$ FW)</td>
<td>430 ± 5</td>
<td>294 ± 3</td>
<td>0.50 ± 0.02</td>
<td>2.9 ± 0.0</td>
<td>3.3 ± 0.0</td>
</tr>
<tr>
<td>P soluble in H$_2$O</td>
<td>96%</td>
<td>1.7%</td>
<td>4.0%</td>
<td>79%</td>
<td>85%</td>
</tr>
<tr>
<td>P soluble in AC</td>
<td>95%</td>
<td>96%</td>
<td>100%</td>
<td>93%</td>
<td>91%</td>
</tr>
<tr>
<td>P soluble in MA</td>
<td>93%</td>
<td>98%</td>
<td>92%</td>
<td>100%</td>
<td>97%</td>
</tr>
</tbody>
</table>

**Struvite**
- Slow release, mixed nutrient fertilizer
- High P-availability in the beginning of the growing season (sand) and stock for later release

**FePO$_4$-sludge**
- Not interesting as start fertilizer
- Potential to increase the capacity of P-deficient soils

**Digestate vs. pig manure**
- Higher yield and P-uptake
- Slower P-release (organic + inorganic) ⇒ less leaching
- Higher potential release of labile/stable soil P (sand)

**PHOSPHORUS USE EFFICIENCY (PUE)**

- Bio-based waste streams have potential for use as sustainable phosphorus fertilizers
- A better categorization of different green organic and inorganic fertilizers in European legislation is required
- A combination of the PAE-method and rhizon soil solution samplers is proposed to evaluate the direct available phosphorus in frame of the fertilization advice