Is Soil Analysis Useful to Farmers for Managing P Fertilisation? An Interview-based Analysis with Annual Crops Growers in South-West France

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Phosphorous (P) is a limited fertiliser resource for which world reserve are quickly depleting. There is therefore an important need for redesigning P fertilisation management and, first of all, to understand farmers' fertilisation management practices. Such an analysis of farmers' practices was implemented, that aimed at (i) describing farmers' P fertilisation practices, (ii) evaluating these practices in term of input-output plot P balance and (iii) understanding the reasons of their practices. This paper presents the first results of this farmers' practices analysis.

**Methodology**

Interviews with farmers were realised in spring 2008 with 38 farmers in South-West France (Bordeaux region) about their P fertilisation practices. The study area included three main types of soil: poor sandy soils, sandy-loam soils and clay soils. The main crops were maize, cereal, sunflower and canning vegetables. One third of farmers grew animals. Farmers were asked their crop management practices, including their crop yields and their P management, and were asked to detail their P fertilisation decision making. Soil analysis, when available, were collected. To evaluate farmers' practices, input/output P balances were performed at the plot scale for each crop of each farmer. Balances were computed as fertiliser and manure supplies multiplied by their composition minus crop yield multiplied by crop P composition (Comifer, 2007).

**Results**

**Farmers' practices evaluation**

Figure 1 shows the distribution of farmers' P fertiliser amounts. Fertiliser amounts were rather homogeneous among crops, except for spring beans that were significantly more fertilised. Figure 2 shows the input/output balances for each considered crop. Balances were positive for canning vegetables, and were null for maize not receiving manure, wheat and sunflower. But maize balances were strongly positive for cases where manure was applied to the crop. Such balances may have strong environmental negative impact. Therefore, farmers' practices were carefully analysed to
understand farmers' decision making.

**Detailed analysis of practices**
A detailed analysis of farmers' practices showed that no farmer use soil analysis as a tool for P fertilisation decision even if all interviewed farmers regularly performed soil analysis on their different plots. On the contrary, P fertilisation was managed on a yearly and species basis: for a given species, a given P fertiliser amount was applied to all the plots of the farm cropped with that species, unrelated to soil P composition. Moreover, farmers who grew cattle did not consider P contained in manure when deciding their P fertilisation. This led, for example for maize crop, to supplying about twice the amount of P that was currently applied on the other plots of the same farm (Figure 3).

Farmers' practices analysis also showed that different types of P fertiliser supply were performed, as represented in Table 1. Most farmers localised their P fertilisation *i.e.*, applied P fertiliser on the row for large row spring crops such as maize or beans. Phosphorous fertiliser localisation was supposed, according to 60% of farmers, to help early crop growth and to give a resistance to poor weather conditions and pest attacks.

![Diagram](image)

Fig 2: Input/output P balances (kg P/ha/yr). Statistical units are farmers. Maize cattle: maize plots receiving cattle manure.

![Diagram](image)

Fig 3: P amount supplied to the different maize crops of the same farms receiving or not cattle manure (kg P/ha/yr).

<table>
<thead>
<tr>
<th>Crop</th>
<th>Fertiliser supplying mode (% of farmers)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Localised supply</td>
</tr>
<tr>
<td>Maize</td>
<td>42</td>
</tr>
<tr>
<td>Green pea</td>
<td>0</td>
</tr>
<tr>
<td>Spring bean</td>
<td>43</td>
</tr>
<tr>
<td>Summer bean</td>
<td>77</td>
</tr>
<tr>
<td>Winter wheat</td>
<td>0</td>
</tr>
<tr>
<td>Sunflower</td>
<td>9</td>
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Table 1: P fertiliser supplying modes. Statistical units are farmers

**Conclusions**
This study suggested the risk of the negative environmental impact that farmers' P management practices may have on water quality, particularly in cases of cattle breeding. It suggested that more detailed analysis should focus on cattle breeders' P management: what are the different driving forces explaining the input/output balances of this type of farms?

**References**