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Impact of rain-fed rice cropping systems on soil fertility in central and northern Benin

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Background

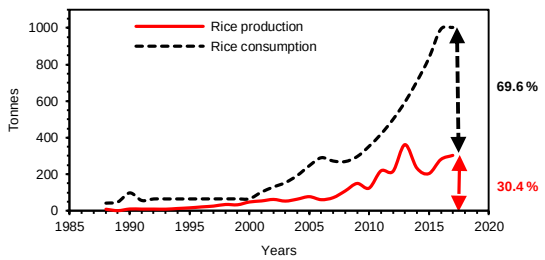

Figure 1. Rice paddy production and rice consumption in Benin from 1988 to 2017 in Benin (FAOSTAT, 2019)

Benin imports each year important quantities of rice to meet the needs of its population (Figure 1) although it has tremendous assets to produce rice and become self-sufficient (Anago *et al.*, 2020).

Research focus and Methodology

- Evaluate the effect of the rain-fed rice cropping systems on soil fertility in northern and central Benin

Three hundred and sixty-two rain-fed rice farmers were surveyed in the municipality of Banikoara, Kandi, Ouèssè and Glazoué in Benin

Soil samples were taken from the rain-fed rice fields and analyzed at laboratory

Results

Three cropping systems emerged from the ascending hierarchical classification results (Figure 2).

Farmers of Banikoara and Kandi practiced more the systems 1 and 2 while the system 3 was predominant in Glazoué and Ouèssè (Figure 3).

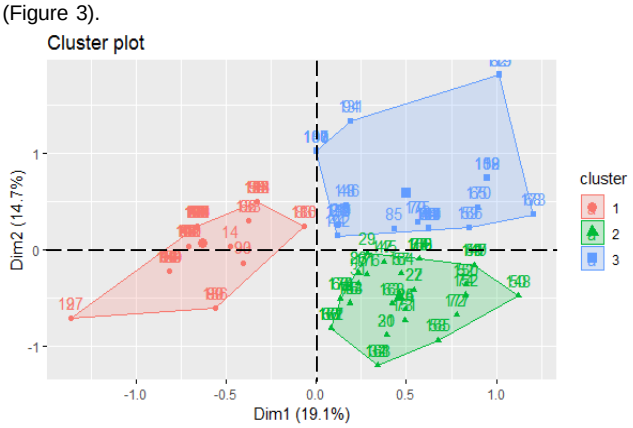

Figure 2. Grouping of farmers in the plan (Axis 1, Ax2)

System 1: **(12%)**

- ✓ didn't use or use less than 50 kg/ha of NPK fertilizer and urea,
- ✓ Adopted local varieties,
- ✓ Practiced direct sowing,
- ✓ Left crop residues in the fields.

System 2: **(49%)**

- ✓ used NPK fertilizers and urea at doses between 50 and 100 Kg/ha,
- ✓ Practiced harness tillage,
- ✓ Direct sowing of local varieties,
- ✓ Use crop residues as animal feed.

System 3: **(39%)**

- ✓ used NPK and urea fertilizers at doses between 100 and 200 kg/ha,
- ✓ Practiced manual tillage or tractor tillage,
- ✓ Direct sowing or sometimes nurseries with improved seeds,
- ✓ Crop residues are left in the fields.

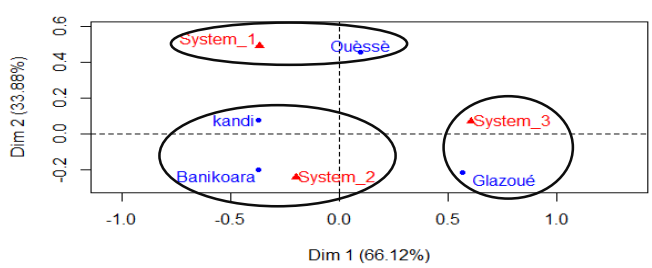

Figure 3. Representation of systems and towns in the plan (Axis 1, Axis 2)

Significant difference between soil chemical parameters of cropping systems were observed (Figure 4).

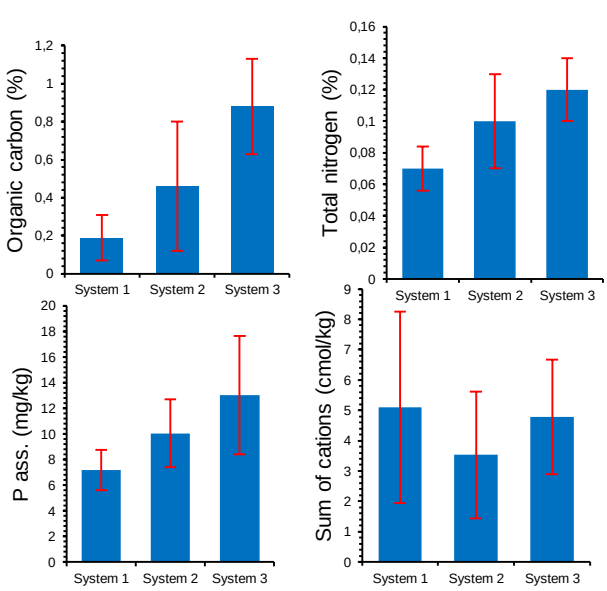

Figure 4. Physicochemical characteristics of rice soils across the cropping systems

Conclusion

In northern Benin, farmers apply a little amount of mineral fertilizer in rice cultivation and crop residues are used for animal feed,

In central Benin, farmers apply mineral fertilizers at rates closed to the recommendation,

It should be noted that these systems degrade soil fertility.

Acknowledgements

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