Synergistic effects of localized application of organic and phosphorus fertilizer on rice growth and yield in P-deficient upland soils of Madagascar

Masinirina Nomenjanahary Anny Ranjakason[1], Aung Zaw Oo[2], Viviane Raharinivo[1], Yasuhiro Tsujimoto[2]

[1]Centre National de Recherche Appliquée au Développement Rural (FOFIFA), Département de Recherche Rizicoles (DRR), Madagascar

[2]Japan International Research Center for Agricultural Sciences, Crop, Livestock and Environment, Japan

1.Introduction

- Smallholder farmers in Madagascar face constraints in upland rice production due to soil P deficiency and limited purchasing capacity.
- P micro-dosing: entry point for sustainable rice production. However, it can cause chemical injury to rice seedlings, negatively affecting rice growth under field conditions

Applying organic materials and P fertilizer locally can reduce chemical damage to seedlings and increase upland rice yield.

2. Materials and Methods

Field experiment

- P fertilizer (5 and 10 kg P ha^{-1}) and/or farmyard manure (FYM) /vermicompost (VC) (0.8t ha^{-1}) were applied in the planting holes.
- Early rice growth at 45 days after sowing (DAS) and grain yield at harvest were measured.

Farmer field experiment in Behenjy.

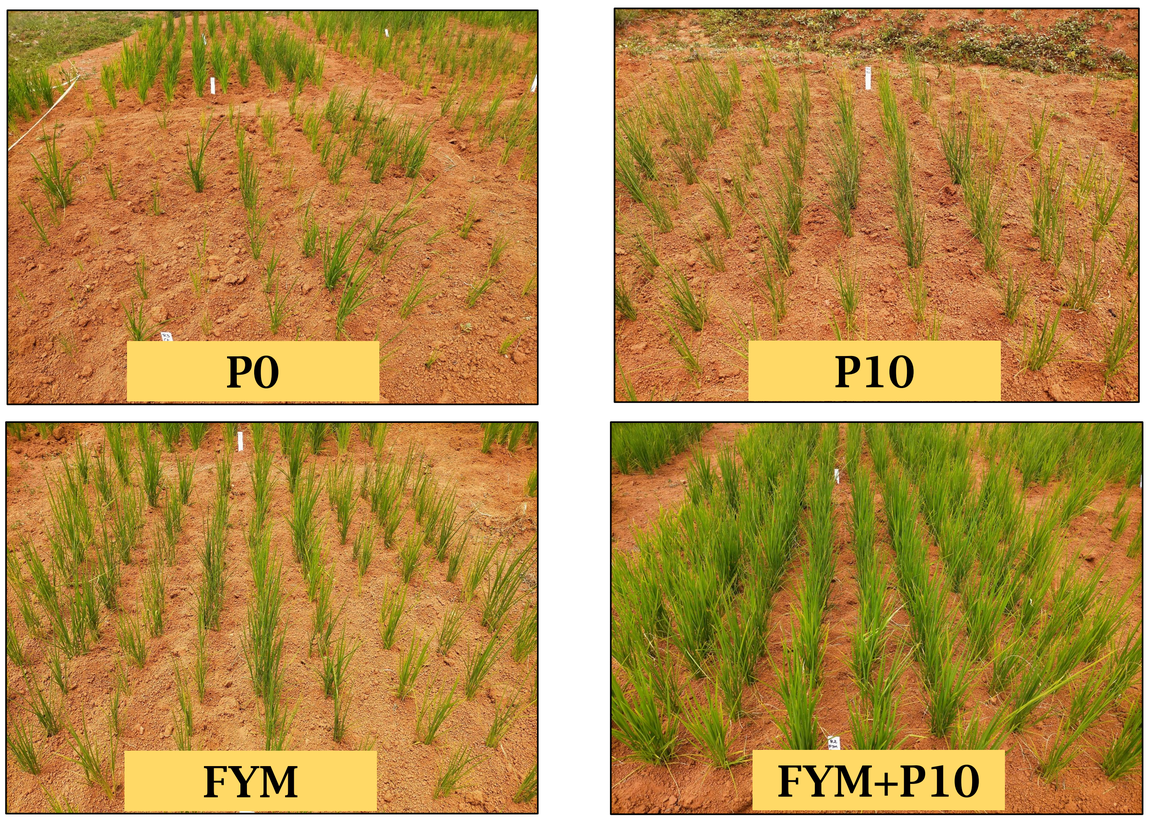

Fig. 1. Localized FYM and P fertilizer impact early rice growth.

3.Results

Early rice growth

- Localized P had a negative effect on early rice growth, whereas combined organic materials and P fertilizer enhanced early rice growth (Fig. 1&2).

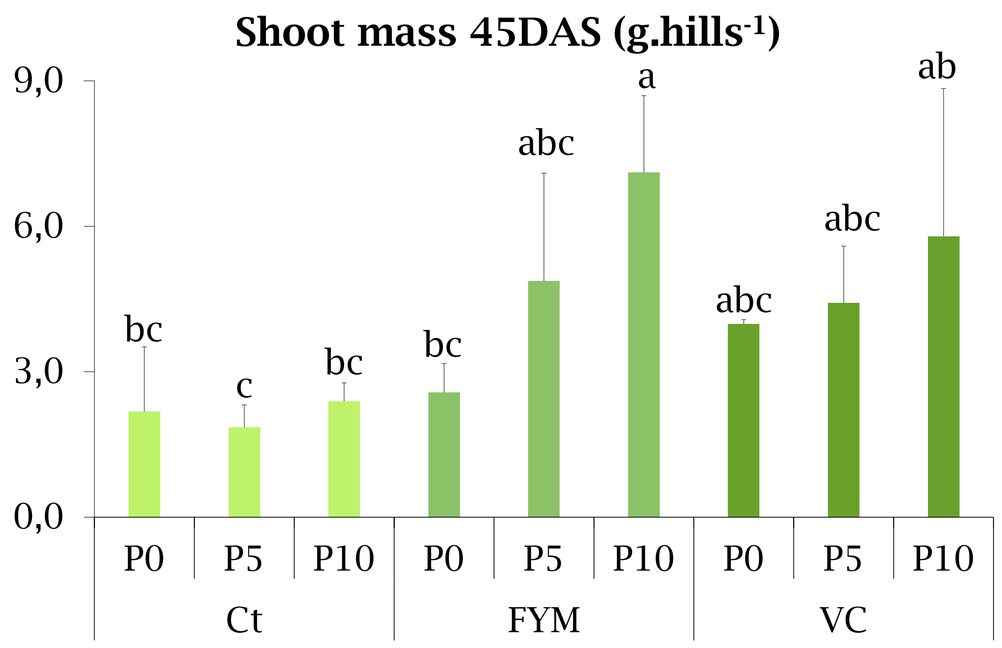

Fig. 2. Early rice growth affected by localized P and organic resources in the upland field.

Grain yield

- No yield increase from localized P compared to the control (Fig. 3)
- The combined application of organic and P fertilizer resulted in a significant increase in grain yield ranging from 51-82%.

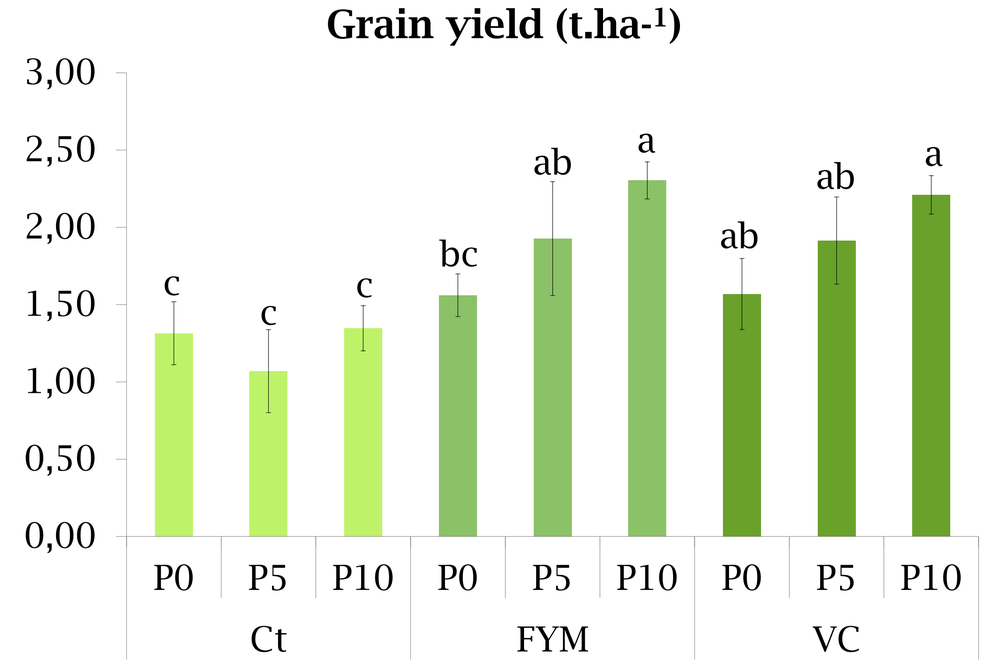

Fig. 3. Rice grain yield affected by localized P and organic resources in the upland field.

4.Conclusion

Local organic resources and P micro-dosing could effectively address soil P deficiency and chemical damage to seedlings and improve sustainable upland rice production for smallholders in Madagascar.

5. Acknowledgement

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