

## **Effects of land use changes on kinetics of potassium release in sweetpotato garden soils of the highlands, Papua New Guinea**

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### **General comments**

I have read this manuscript carefully and with great interest, and I confess that I liked it very much. I have no objections to the experimental design and discussion of results. The manuscript falls within the scope of SE and publication is highly recommended.

I just think there is a little problem. Sometimes it seems that the authors only focus on the analyzed soils of PNG, but this work is valid globally. Especially, when the release of potassium is related to the different compartments of the exchange complex, results cannot be locally limited. Therefore, the authors recommend that give it another go to the document, emphasizing the relevance of the results, not only local implications in highlands of PNG.

I strongly recommend changing the title to something similar to this: "Kinetics of potassium release in sweet potato-cropped soils. A case study in the highlands of Papua New Guinea".

I am not an English-native speaker, but "farm" sounds better than "garden" to me. Gardening refers to outdoor enjoyment with a particular design of planting and management, not food production.

The difference between "old" and "new" gardens is not clear. It looks like you are talking about traditional/innovative management or simply before and after a certain date. I suppose, "new" means "after land use change", but during how much time? Not clear.

Concerning the abstract, I have found only a small problem. The objective of this research and a general overview of the necessity of studying K dynamics in the area are well depicted in the introduction. In contrast, the abstract does not refer to this (although general results and conclusions are well described). I suggest including some lines at the beginning focusing the problem and describing the objectives.

### **Detailed comments**

#### **Page 2844**

Line 5 It looks like 569 h was the only period for extraction, instead of sequential extraction at different periods between 1 and 569 h. Please, re-word this sentence.

#### **Page 2845**

Line 18 Re-write: "the Highland provinces of PNG (Southern...".

Line 22 What do you mean with "old" and "new" gardens? Please, explain. So, the reader will not have to access the cited references.

#### **Page 2846**

Line 5 "How well it is replenished...": I suppose this is in absence of fertilization.

Line 15 Re-write: "kinetics have been".

**Page 2847**

First paragraph

Please, add the classification system used for soil type. I suggest this citation:

- Soil Survey Staff. Keys to Soil Taxonomy, 12th ed. USDA-Natural Resources Conservation Service. Washington, DC. 2014.

It is available at

[http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/class/?cid=nrcs142p2\\_053580](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/class/?cid=nrcs142p2_053580).

Line 4

Commonly, readers outside PNG do not know much about lithological variability in the country. Add the main types (might be only the major groups) of volcanic (acid/basic lavas, basalts, sedimentary volcanic rocks...) and non-volcanic parent materials of your soils, which may be very different and relevant for this research. If possible, add this information to Table 1, instead of just volcanic/non-volcanic.

Line 16

Please, specify why did you select these sampling depth. Are 0-10 and 10-20 cm layers related with any soil characteristic or soil root? Is soil depth limited by consolidated rock? The only information in table 1 is surface/sub-surface.

Line 17

The assessment of organic C by dry combustion may vary between simple combustion in furnace and collection of CO<sub>2</sub> (e.g. Tiessen and Moir, 1993) and neutron scattering (Wielopolski et al., 2000). Please, explain your method briefly or add a reference.

Lines 23-24

Re-write: "was conducted, according to Jalali (2005)".

Lines 25-26

What periods?

**Page 2849**

Line 10

For homogeneous style, substitute "carbon" with "C".

Lines 14-19

I suggest including here the intervals. If not, it is necessary to access the references to know what do you mean with "low", "medium" or "high" category.

**Page 2850**

Line 5

Re-write: "patterns".

Line 24

Please, add a reference for this statement.

**Figures 1 and 5**

Why not color? In fig. 1, color has been added only to external line in the diamond series. I strongly recommend using color symbols, not a W/B graph.

Substitute "t (h)" with "Time (h)".

One tip: It seems that the images have been elongated in the vertical direction, deforming letters, numbers and symbols.

Just a comment: have you tried representing extraction periods in the X-axis (in a natural time scale) of fig. 1, instead of 100 h steps?

**Figures 2, 3 and 4**

Color?

P values (<0.05) in all cases may be moved to the caption. So, the figures looks cleaner.

**Figure 4**

Re-write: "Error bars indicate standards errors for..."