

Review of: "Subsoil-potassium depletion accounts for the nutrient budget in high-potassium agricultural soils"

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This paper assessed continuous potassium (K) removal without replenishment in Argentinean soils. Topsoil exchangeable-K levels under agriculture resulted 48% lower than their pristine conditions, although still above response levels. Both soil exchangeable-K and slowly-exchangeable K vertical distribution patterns (0–100 cm) displayed substantial depletion relative to pristine conditions, mainly concentrated at subsoil (20–100 cm). Higher pristine levels of exchangeable-K and slowly-exchangeable-K and lower clay and silt contents resulted in higher soil-K depletion. Soil K management guidelines should consider both topsoil and subsoil nutrient status and variables related to soil K buffer capacity.

There are several concerns with this study which include the following:

1. K in plant litter can be leachable in large quantities whether the litter is decomposed or not (see <https://www.sciencedirect.com/science/article/pii/S0265931X20300953>). The assumption by authors that negligible K losses from leaching and/or runoff seems not reasonable.
2. According to the Methods section, crop residues were not removed or grazed. Thus, K in residues will leach into the topsoil after the crop residues decomposed. The K replenishment resulted from the decomposition of crop residues at the topsoil can underestimate the K uptake by crops from the topsoil.
3. This paper discussed only K element budget and no other nutrient element budget. Thus, the term "nutrient budget" in the title of the paper seems inappropriate.