

Article title	Long-term effects of integrated soil fertility management practices on soil chemical properties in the Sahel
Authors	Alexis M. Adams, Adam W. Gillespie , Gurbir S. Dhillon, Gourango Kar, Colin Minielly, Saidou Koala, Badiori Ouattara, Anthony A. Kimaro, Andre Bationo , Jeff J. Schoenau & Derek Peak
Keywords	Soil fertility, Soil properties
Abstract	<p>Joint application of mineral and organic fertilizers and incorporation of legumes into cropping systems, known as integrated soil fertility management (ISFM), has improved short-term crop productivity in sub-Saharan Africa. Little research exists, however, on the effectiveness of long-term <u>ISFM</u> in improving soil quality and productivity. This study determined the long-term effects of different ISFM treatments on soil chemical properties and OM dynamics up to 20 cm soil depth at a long-term research site at Saria, Burkina Faso. The ISFM treatments applied from 1960 to 2008 included broadcasted fertilizer (100 kg ha<sup>-1</sup> 14-23-14 (NPK) with 50 kg ha<sup>-1</sup> urea; and NPK with an additional 50 kg ha<sup>-1</sup> urea and 50 kg ha<sup>-1</sup> KCl) supplemented with crop residue retention, and with manure application at 5000 or 40000 kg ha<sup>-1</sup>. In addition, continuous cropping of <i>Sorghum bicolor</i> (sorghum) was compared to yearly rotation between sorghum and <i>Vigna unguiculata</i> (cowpea). The large manure rate (40,000 kg ha<sup>-1</sup>) supplement was most effective in buffering fertilizer-application-induced pH decline and increasing grain yield, soil carbon (C), nitrogen (N), and phosphorus (P) concentrations (<math>p &lt; 0.05</math>). Manure application also enhanced the microbial cycling and retention of C and N microbial byproducts compared to other fertilizer treatments, as indicated by C and N X-ray Absorption Near Edge Structure (XANES) spectroscopies. Legume-cereal cropping led to increased abundance of C and N functional groups indicative of reduced OM breakdown compared to the continuous cropping system. Supplemental application of manure with mineral fertilizers under mixed cereal-legume cropping was found to be most effective in improving long-term soil fertility and crop productivity in the Sahel.</p>
Publication date	2020-05
Citationas	<p>Alexis M. Adams, Adam W. Gillespie, Gurbir S. Dhillon, Gourango Kar, Colin Minielly, Saidou Koala, Badiori Ouattara, Anthony A. Kimaro, Andre Bationo, Jeff J. Schoenau, Derek Peak,  Long-term effects of integrated soil fertility management practices on soil chemical properties in the Sahel,  Geoderma, Volume 366, 2020, 114207,ISSN 0016-7061,  <a href="https://doi.org/10.1016/j.geoderma.2020.114207">https://doi.org/10.1016/j.geoderma.2020.114207</a>.</p>
Article link	<a href="https://doi.org/10.1016/j.geoderma.2020.114207">https://doi.org/10.1016/j.geoderma.2020.114207</a>