

Article title	Cereal/legume rotation effects on cereal growth in Sudano-Sahelian West Africa: soil mineral nitrogen, mycorrhizae and nematodes
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Keywords	Sorghum, Groundnuts, Millet, Cowpeas
Abstract	<p>Yield increases of cereals following legumes in rotation have been previously reported for West Africa, but little progress has been made to explain the mechanisms involved. At four sites in Niger and Burkina Faso, field trials with pearl millet (<i>Pennisetum glaucum</i> (L.) R. Br.), cowpea (<i>Vigna unguiculata</i> (L.) Walp), sorghum (<i>Sorghum bicolor</i> (L.) Moench) and groundnut (<i>Arachis hypogaea</i> L.) were conducted from 1996 to 1998 to investigate the role of soil mineral nitrogen (N_{min}), native arbuscular mycorrhizae (AM) and nematodes in cereal/legume rotations. Grain and total dry matter yields of cereals at harvest were increased by legume/cereal rotations at all sites. Soil N_{min} levels in the topsoil were consistently higher in cereal plots previously sown with legumes (rotation cereals) compared with plots under continuous cereal cultivation. However, these rotation effects on N_{min} were much larger with groundnut than with cowpea. Roots of rotation cereals also had higher early AM infection rates compared to continuous cereals. The dominant plant-parasitic nematodes found in all experiment fields were <i>Helicotylenchus</i> sp., <i>Rotylenchus</i> sp. and <i>Pratylenchus</i> sp. In sorghum/groundnut cropping systems, nematode densities were consistently lower in rotation sorghum compared to continuous sorghum. Continuous groundnut had the lowest nematode densities indicating that groundnut was a poor host for the three nematode groups. In millet/cowpea cropping systems with inherently high nematode densities, crop rotations barely affected nematode densities indicating that both crops were good hosts. These results suggest that on the nutrient poor Sudano-Sahelian soils of our study, total dry matter increases of rotation cereals compared with continuous cereals can be explained by higher N_{min} and AM infection levels early in the season. The site-specific magnitude of these effects may be related to the efficiency of the legume species to suppress nematode populations and increase plant available N through N₂-fixation.</p>
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