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Soil fertility and the role of soils for food security in developing countries

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Addressing current and future food security is not just a matter of producing more food globally. Agricultural productivity must increase where food is most needed, and where both rural and urban populations are expected to increase the fastest in the near future. This is the situation in most of sub-Saharan Africa and in several other regions of Latin America, Asia and the Pacific. There are some common denominators to these regions. In the first place, the inability of the majority of farmers to access and/or to afford agricultural inputs. Second, the severity with which climate change impacts on some of these regions. Third, the extent of soil degradation, which is estimated at 25% of the arable land in the world. And finally, the fact that some of these regions are hosting valuable biodiversity and/or delivering ecosystem services of global or regional importance, which often leads to competing claims between the local and international communities. It has been repeatedly shown that the technologies of industrial agriculture as practiced in developed regions are ineffective at sustaining soil productivity in the context of smallholder family agriculture. Restoring soil productivity and ecosystem functions in these contexts requires new ways of managing soil fertility. These include: (i) innovative forms of 'precision' agriculture that consider the diversity, heterogeneity and dynamics of smallholder farming systems; (ii) a systems approach to nutrient acquisition and management; (iii) agroecological strategies for the restoration of degraded soils and the maintenance of soil physical properties; and (iv) to capitalize on the recent and growing understanding on soil trophic networks to increase nutrient and water use efficiency. I will provide examples on advances in these fronts, and discuss the challenges ahead their broad implementation by farmers in developing regions.