Geophysical Research Abstracts
Vol. 14, EGU2012-13323-1, 2012
EGU General Assembly 2012

Organic cotton systems improved soil properties vis-a-vis the modern systems

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India is the largest cotton growing country in the world. Traditionally, cotton in India was grown with minimal inputs and resources available on farm were put to efficient use. Advent of hybrids and Bt cotton revolutionized cotton production in the country and lead to heavy reliance on external inputs. However, there is a growing awareness of the detrimental effects of excessive use of pesticides and fertilizers. This is leading to growing interest in organic cultivation of crops. An organic system (OS) was compared with the modern systems (MS) for changes in the soil physical, chemical and biological properties in field experiments conducted both on station and farmers fields in Maharashtra, India on rain dependent cotton grown on Vertisols.

Soil samples of the organic plots had significantly greater C content than the MS plots relying on mineral fertilizers and pesticides. Similarly, other nutrients were also greater in the OS than the MS across locations. Most of the increases were noticed in the top 30 cm of the soil profile. Interestingly, enrichment of the soil at lower depths was noticed in the OS which could be due to the surface creep of soils through the cracks in the Vertisols.

With regard to the physical properties, water-stable aggregates and mean weight diameter in the MS were significantly lesser than the OS. Differences were restricted to the top 20 cm.

Soil biological properties of the two systems were compared through the enzyme assays such as the dehydrogenase, glucosidase, phosphatase, sulfatase periodically during the crop growing season. All the enzyme assays indicated greater activities in the OS than the MS. Further, microfauna (nematodes) monitored indicated less of plant parasitic nematodes in the OS than the MS. Excessive tillage followed in the MS did bring about a reduction in the nematode numbers. But the systems had more parasitic nematodes.