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Manure usage in restoration of degraded crop land

In the Great Plains of North America, soil degradation particularly by wind erosion became a problem in the late 18th and early 19th century soon after agriculture expanded to the semi-arid region and the land was broken from sod. Therefore, some farmlands lost top soil rich with organic materials and plant nutrients and consequently decrease their economic value. This study evaluates land productivity and changes in soil properties of eroded land influenced by (1) nitrogen types (manure vs. commercial fertilizer); (2) nitrogen rates (high vs. low) and (3) tillage practices (no-tillage vs. conventional tillage). Two eroded sites were chosen in central Great Plain Region, one site in Akron, CO with topsoil loss of approximately 17 to 20 cm and the second site located in Hays, KS with topsoil loss of approximately 25 cm. The Akron site was established in 2007 and the Hays site was established in 2006. The annual manure application range between 11 to 15 Mg manure per ha for the low N rate and approximately 22 to 30 Mg manure per ha for the high N rate. Throughout the first 5 years of the study period, weather patron specifically the precipitations affected the yield. The amount of rain and its distribution throughout the growing seasons and during the crop critical period in addition to the ambient temperature explained some yield response to the treatments. The least limiting Water Range (LLWR) was influenced by manure addition. The relationship between the LLWR and crop yields was stronger in Hays site than in Akron site. In Hays site, annual manure addition significantly altered soil chemical properties compared with commercial fertilizer especially at the top 15 cm. Soil organic C and changes in soil organic C were greatly influenced by manure addition. Soil inorganic N leaching was also detected during the winter months. Overall, the addition of organic amendments restored the productivity of eroded soil and improved some aspects of soil quality compared with commercial fertilizer. Apparently, more than 5 years are required to assess the treatment benefits on soil quality and productivity in such eroded land.

Biography

Maysoon M Mikha has completed her Ph.D in 2003 from Kansas State University, Manhattan, Kansas USA. Currently, working as a Soil Scientist at the United State Department of Agriculture-Agricultural Research services (USDA-ARS) in Akron, Colorado. Her research interests are in Soil organic matter dynamics with different management practices; Kinetic assessment of carbon and nitrogen mineralization; Remediation of eroded soil using organic amendment to improve soil quality and plant productivity and the influence of residue removal on soil quality and sustainability. She has authored and co-authored about 30 referee manuscripts published in international journals, four book chapters and six conference proceedings.

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