ABSTRACT

Low adoption of soil fertility technologies, partially attributed to low technology outscaling initiatives, is a critical hindrance to agricultural productivity enhancement of most smallholder farms in sub-Saharan Africa. Application of geospatial tools for spatial suitability evaluation of soil fertility management technologies can be a breakthrough in their promotion and out-scaling existing novel technological initiatives. The study objective was to develop a data-driven multi-influencing-factor (MIF) geospatial approach for out-scaling organic-resource based soil fertility management technologies. Using the developed geospatial approach, we delineated suitable zones for targeted out-scaling of organic resource technologies in the Upper Tana River (UTC) catchment in Kenya. We acquired multiple datasets from different sources and used them to prepare thematic layers. The factors used included rainfall, elevation, cattle density, bulk density, slope, soil pH, soil organic carbon, cation exchange capacity, drainage, and soil texture. The input layers were georeferenced, converted to raster formats, standardized to a range of 1 to 5, after which we generated the suitability map through a weighted overlay technique. The delineated suitability map showed that about 0.002% of UTR was least suitable, 4.7% marginally suitable, 38.5% moderately suitable, 34.7% medium-high suitable while 0.03% was highly suitable for organic resources out-scaling The results obtained indicate the potential of the geospatial approach as a scaling out methodology for organic-based soil fertility technologies. The suitability delineation established that Nyeri, Murang'a and Meru are the most suitable areas for the use of most organic resources in the Upper Tana catchment of the Central Highlands of Kenya. The suitability maps can inform policymakers, planners, and decision-makers in identifying the suitable sites for the use of organic-based soil fertility resources. Based on this study, we recommend the use of the developed a data-driven multi-influencing-factor (MIF) geospatial approach in the scaling out of the organic-based soil fertility technologies, not only in the study area but also other regions in sub-Saharan Africa