Abstract

Natural zeolites could be applied as smart delivery system for controlled release of agricultural inputs resulting in enhanced productivity and reduced environmental pollution caused by excessive use of fertilizer and pesticides. This is because zeolites have nano porous voids and channels that can be loaded with quest molecules like urea fertilizer and pesticides. The formulated zeolite composites can then be applied as carrier agent for target and slow delivery of the fertilizer or pesticide to the intended part of the plants, thus improving the efficiency and effectiveness of the agricultural inputs. Besides, these zeolites being natural are meant to be more cost effective and pose less harm to the environment. This research work aimed at sampling natural zeolites from different parts in Kenya and characterizing them in comparison with the commercial zeolites applied as the standard. Kinetics studies were then conducted to determine their fertilizer and pesticide loading properties. After which formulation, modelling, and agronomic simulation studies were done using urea and lambda cyhalothrin pesticide on tomatoes and spinach. Sample collection was done, guided by Kenya's geological and mineralogical mapping in five selected places named as Eburru volcanic crater, Lake Magadi, Lake Baringo, Ebulbul-Ngong, and Kitum caves-Mt. Elgon. The collected samples transported to the laboratory were mechanically grinded and sieved to obtain homogeneous fine particles...