In Kenya, maize (*Zea mays* L.) is mainly grown on acid soils in high rainfall areas. These soils are known for low available phosphorus (P), partly due to its sorption by aluminium (Al) and iron oxides. The study determined soil P sorption, lime requirements and the effects of lime on soil pH, Al levels and available P on the main maize growing acids soils in the highlands east and west of Rift Valley (RV), Kenya. Burnt lime containing 21% calcium oxide was used. The soils were strongly to extremely acid (pH 4.85-4.07), had high exchangeable Al^{3+} (> 2 cmol Al kg^{-1}) and Al saturation (> 20% Al), which most maize germplasm grown in Kenya are sensitive to. The base cations, cation exchange capacity and available P (< 10 mg P kg^{-1} bicarbonate extractable P) were low, except at one site in the highlands east of RV indicative with history of high fertilizer applications. Highlands east of RV soils had higher P sorption (343-402 mg P kg^{-1}) than the west (107-258 mg P kg^{-1}), probably because of their high Al^{3+} ionsand also the energies of bonding between the soil colloids and phosphate ions. Highlands east of RV also had higher lime requirements (11.4-21.9 tons lime ha^{-1}) than the west (5.3-9.8 tons lime ha^{-1}). Due to differences in soil acidity, Al levels and P sorption capacities within and between highlands east and west of RV, blanket P fertilizer and lime recommendations may not serve all soils equally well.