A field study was carried out to assess the effect of potato - legumes intercropping on nutrient use efficiency indices namely, Nitrogen use efficiency (NUE), Nitrogen uptake efficiency (NUpE) and Nitrogen harvest index (NHI) and yield. The experiment was laid in a randomized complete block design (RCBD) with four replicates at Upper Kabete Campus field station, University of Nairobi during the 2014 short (October-December) and 2015 long (March to June) rainy seasons. The treatments comprised of Sole Potato (CS1) and Potato intercropped with either climbing bean (*Phaseolus vulgaris L.*) (CS2) garden pea (*Pisum sativum*) (CS3) or dolichos (*Dolichos lablab)* (CS4). A basal 200 kg/ha of 17N:17P:17K fertilizer was band applied at planting and an equivalent quantity of CAN (27% N) as a top dress to potato crop only at tuber initiation stage. The indices differed significantly among treatments (p<0.05) during the two seasons. In season one, CS4 and CS2 recorded the highest and lowest NUpE (Mg kg-1 ha-1) at 36.8 and 26.5 respectively while in season two, CS4 andCS2 hadthehighest (44.31) and lowest (37.12) respectively. Tuber dry matter yield, which reflected the NUE followed the significant trend CS4> CS1> CS3 > CS2 ranging between 0.021 Mg kg-1 ha-1 and 0.027 Mg kg-1 ha-1 in the two seasons. Only in the second season did the NHI (proportion of nitrogen retained in the tubers to the total plant uptake) showed a significant trend (CS3> CS4> CS1 > CS2) ranging from 50 % – 65 %. In terms of tuber yield, CS4 and CS2 recorded the highest (26.63 Mg ha-1) and lowest (18.31 Mg ha-1) respectively in the short rains and CS1 with39.32 Mg ha-1 and CS1 with 36.91 Mg ha-1 in the long rains season. D*olichos lablab* (CS4) was the most effective intercrop and could be recommended for integration into potato cropping systems to improve NUE and productivity.