ABSTRACT

Low soil fertility and reduced seasonal rainfall contribute to low potato (Solanum tuberosum L.) yield in Kenya. Nitrogen (N) deficiency is the major problem facing by the smallholder farmers of Kenya due to lack of fallow. Hence an introduction of supplemental irrigation with an adequate application of this nutrient could increase potato yield. The objective of this study was to determine the effects of supplemental irrigation and N-fertilisation on potato tuber yield, water use efficiency (WUE) and nitrogen use efficiency (NUE). The experiment was conducted in Nakuru County, Kenya for two seasons. The experimental soils are classified as mollic Andosols. The treatments comprised two irrigation treatments of full supplemental irrigation (FI) and rainfed production (RF) and four N levels of four N levels of 0 (N0), 60 (N1), 90 (N2) and 130 kg N/ha (N3).ResultsThe results showed that total tuber yield, marketable tuber yield and NUE were significantly ($P < 0.001$) affected by irrigation × N-fertilisation while WUE was only affected ($P < 0.001$) by N-fertilisation. The highest total tuber yield, 58.28 tonnes/hectare (t/ha), was recorded under FI combined with N3. Treatment FI significantly increased marketable tuber yield by approximately 125.58% in all N treatments compared to RF. The highest NUE of potato (236.44 kg/kg of N) was obtained under FI combined with N3 but not significantly different from the NUE of potato obtained under FI with N2. N-fertilisation N3 produced the highest WUE of 14.24 kg/m3. Significant correlation was obtained between tuber yield and number of tubers/plant ($r = 0.75$, $P < 0.001$), NUE ($r = 0.95$, $P < 0.001$) and WUE ($r = 0.72$, $P < 0.001$).ConclusionHigh potato yield and marketable tuber yield can be achieved in mollic Andosols when water deficits of the growing season are eliminated with supplemental irrigation and an application of 130 kg N/ha.