



Crop water productivity and economic return of rain fed potato-legume intercropping systems

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Abstract: Reliance on rain-fed potato-legume intercropping systems among resource constrained smallholder farmers is usually ineffective without considering their economic viability. A field experiment conducted at the University of Nairobi, Kenya, in the growing seasons of 2014 to 2016 evaluated the effect of intercropping potato with legumes on soil moisture content (SMC), evapotranspiration (ET), potato equivalent yield (PEY), net income and crop water productivity (CWP) based on PEY (CWP_{PEY}) and economic returns (CWP_E). The treatments comprised of pure potato (*Solanum tuberosum* L.) stand (PS), potato-dolichos (*Lablab purpureus*) (PD), potato-garden pea (*Pisum sativum*) (PG) and potato-bean (*Phaseolus vulgaris*) (PB). Results showed significantly higher SMC values at tuber initiation stage: 77, 69, 67 and 62 mm in PD, PG, PB and PS, respectively. Fresh tuber yield was highest in PS (36 t ha⁻¹) and PD (35 t ha⁻¹) and lowest in PG (29 t ha⁻¹). PEY was higher under intercropping than monocropping systems. The lowest ET values that were recorded in PS (630 mm) and PG (631 mm) differed significantly from those in PB (636 mm) and PD (642 mm). Potato-dolichos was the most profitable cropping system with a net income of 9,174 US\$ ha⁻¹ and a BCR of 5.7 compared to PS (7,436 US\$ ha⁻¹) with a BCR of 5.1. CWP_{PEY} varied significantly between cropping systems in the order of PD (6.2 kg ha⁻¹ m⁻³) > PB (4.7 kg ha⁻¹ m⁻³) > PG (4.3 kg ha⁻¹ m⁻³) > PS (2.3 kg ha⁻¹ m⁻³). A similar trend was observed for CWP_E with values of between 1.3 US\$ ha⁻¹ m⁻³ for PD and 1.5 US\$ ha⁻¹ m⁻³ for PS. The study shows that dolichos is a viable legume crop that could be integrated into potato cropping systems to improve their CWP without compromising the tuber yield.

Keywords: Intercropping; evapotranspiration; potato equivalent yield; economic returns

References

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