

# Effect of Soil Surface Roughness and Crop Cover on Soil Loss under Potato-Legume Intercropping Systems, Kenya

## Introduction

- Potato production entails a lot of soil disturbance despite the fact that the crop maintains protective cover only for a short time.
- Hilling activity changes soil surface roughness which induces soil erosion.
- This study assessed the effect of soil surface roughness and crop cover on soil loss under potato-legume intercropping systems.



Fig. 1.0: Potato tubers exposed after soil erosion event

## Methodology

- The experiment was set up in runoff plots laid out in randomized complete block design during the rainy seasons of 2014/15.
- The treatments comprised of Bare Soil, Potato+Garden Pea, Potato+Climbing Bean, Potato+*Dolichos lablab* and Sole Potato.
- Relief meter and point frame techniques were used to estimate soil surface roughness and crop cover respectively.



Fig. 2.0: Surface roughness determination



Fig. 3.0: Cover estimation

## Results

- *Dolichos lablab* contributed postharvest cover which minimized offseason soil losses (Table 1.0).
- Linear dependence ( $p < 0.05$ ) of soil loss on cover and surface roughness was detected in Potato+*Dolichos* treatment indicating that this system was effective in erosion control (Table 2.0).

Table 1.0: Soil loss under different cropping systems

Cropping system	Short Rains, 2014	Long Rains, 2015	Short Rains, 2015	Mean cumulative soil loss
	Soil loss (t ha <sup>-1</sup> )			
Bare Soil	20.4a	66.0a	88.7a	175.1a
Potato+ Garden Pea	7.2c	20.3c	33.3c	60.8c
Potato+Climbing Bean	4.9d	15.4d	23.6d	43.9d
Potato+ <i>Dolichos</i>	2.5e	7.0e	8.8e	18.3e
Sole Potato	9.1b	24.8b	42.3b	76.2b

Table 2.0: Response of soil loss to crop cover and surface roughness

Dependent variable= soil loss	Coefficients	Standard Error	T	P> t
Independent Variables				
Cover	-0.252	0.067	-3.731	0.001
Surface Roughness	-0.005	0.066	-4.074	0.000
Surface Roughness x Cover	-0.268	0.001	-3.977	0.000
<b>Treatment</b>				
Sole potato	0.000	(base)		
Potato+ Garden Pea	-0.861	1.752	-0.491	0.626
Potato + Climbing Bean	-1.586	1.886	-0.841	0.505
Potato + <i>Dolichos</i>	<b>-1.724</b>	1.677	-1.028	<b>0.010</b>
Constant	13.89	2.075	6.693	0.000

## Conclusions and Recommendations

- *Dolichos lablab* provided post-harvest cover which interacted with the effects of surface roughness to keep infiltration at a high level and thus minimized soil loss.
- Studies should be conducted to assess the effect of Potato-*Dolichos* intercropping systems on tubers yield.

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