

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/321874605>

Water use Efficiency and Yield of Potato in Potato-legume Based Intercropping Systems in a Semi-humid Region, Kenya

Conference Paper · July 2017

CITATIONS
4

READS
141

4 authors, including:



Harun Gitari
Kenyatta University
11 PUBLICATIONS 41 CITATIONS

SEE PROFILE



Charles Gachene
University of Nairobi
105 PUBLICATIONS 742 CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:



Potato yield gap analysis in the context of Sub-Saharan Africa (SSA) [View project](#)



On-farm evaluation of the effect of positive selection on the yield of Irish potato under conditions of high virus disease pressure. [View project](#)

**WATER USE EFFICIENCY AND YIELD OF POTATO
IN POTATO-LEGUME BASED INTERCROPPING
SYSTEMS IN A SEMI-HUMID REGION, KENYA**

*Gitari H. I., Gachene C., Karanja N., Schulte-Geldermann
E. (Nairobi, Kenya)*

Introduction

- Potato is an important food security crop in Kenya mainly cultivated under unpredictable rain fed conditions.
- Given that the crop is very sensitive to drought conditions various methods have been proposed to enhance water use efficiency. They included: increased fertilization, plastic film and mulching.
- Advantages and disadvantages.
- Can cover crops be used instead?
- Aim : Identify a potato-legume intercropping system that is efficient in water utilization and still upholding optimum potato yield.

Materials and Methods

- The experiment was laid in RCBD with 4 replicates at UoN for 4 seasons from short rains of 2014 to the long rains in 2016.
- The treatments were: Sole Potato and Potato intercropped with either lablab (*Dolichos lablab*), garden pea (*Pisum sativum*) or climbing bean (*Phaseolus vulgaris*).
- Plots measured 4 x 6 m and data collection done from the central 2 by 3m quadrants
- SMC and cover were determined fortnightly using HSM 50 soil moisture meter and sighting frame, respectively.
- $ET (m^3) = P + I \pm \Delta S \quad RO - DD.$ $WUE (kg/ha/m^3) = Y / (ET * 10)$
- Data Analysed using R Software, version 3.2.3 and means separated using Tukey's post hoc test.

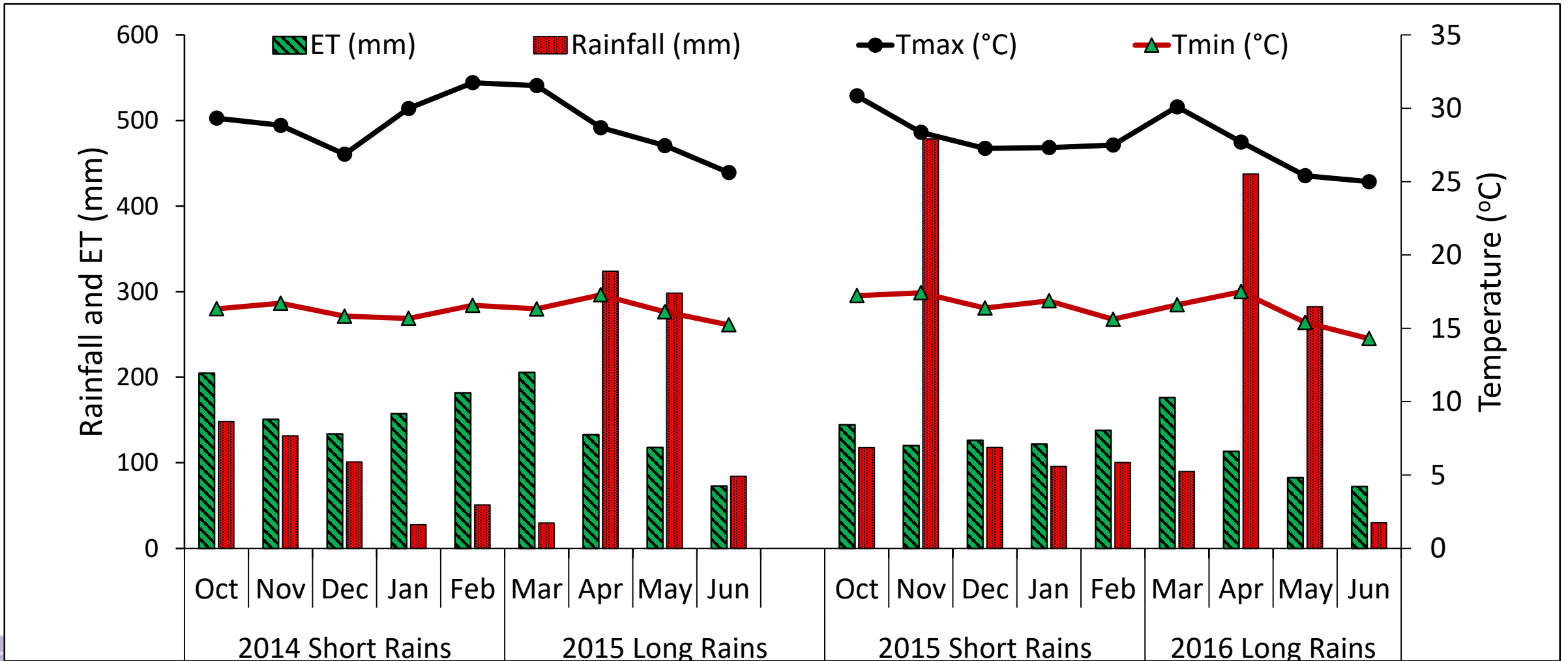
Results

Among the potato legume plots, *D. Lablab* had the highest ground cover

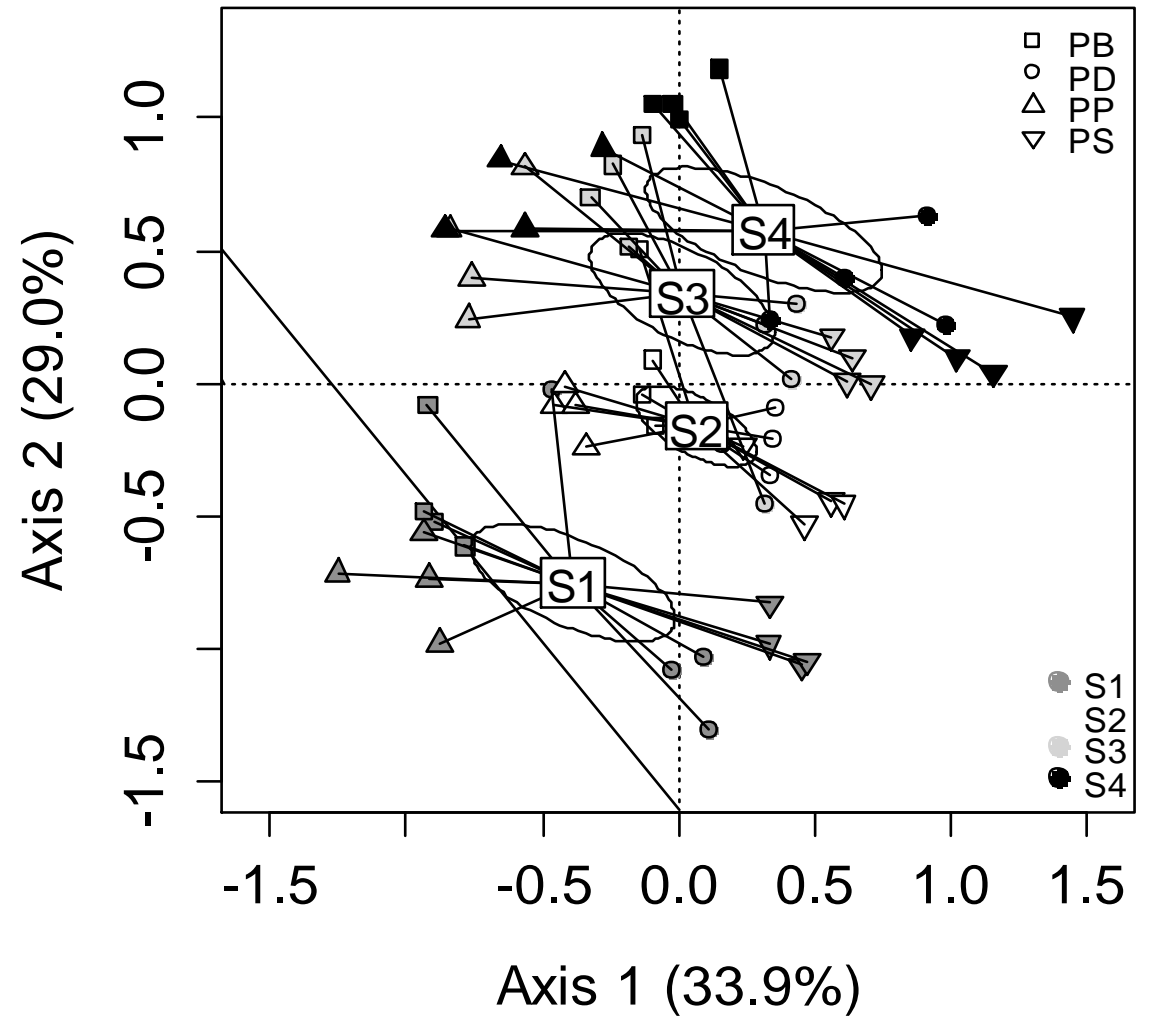
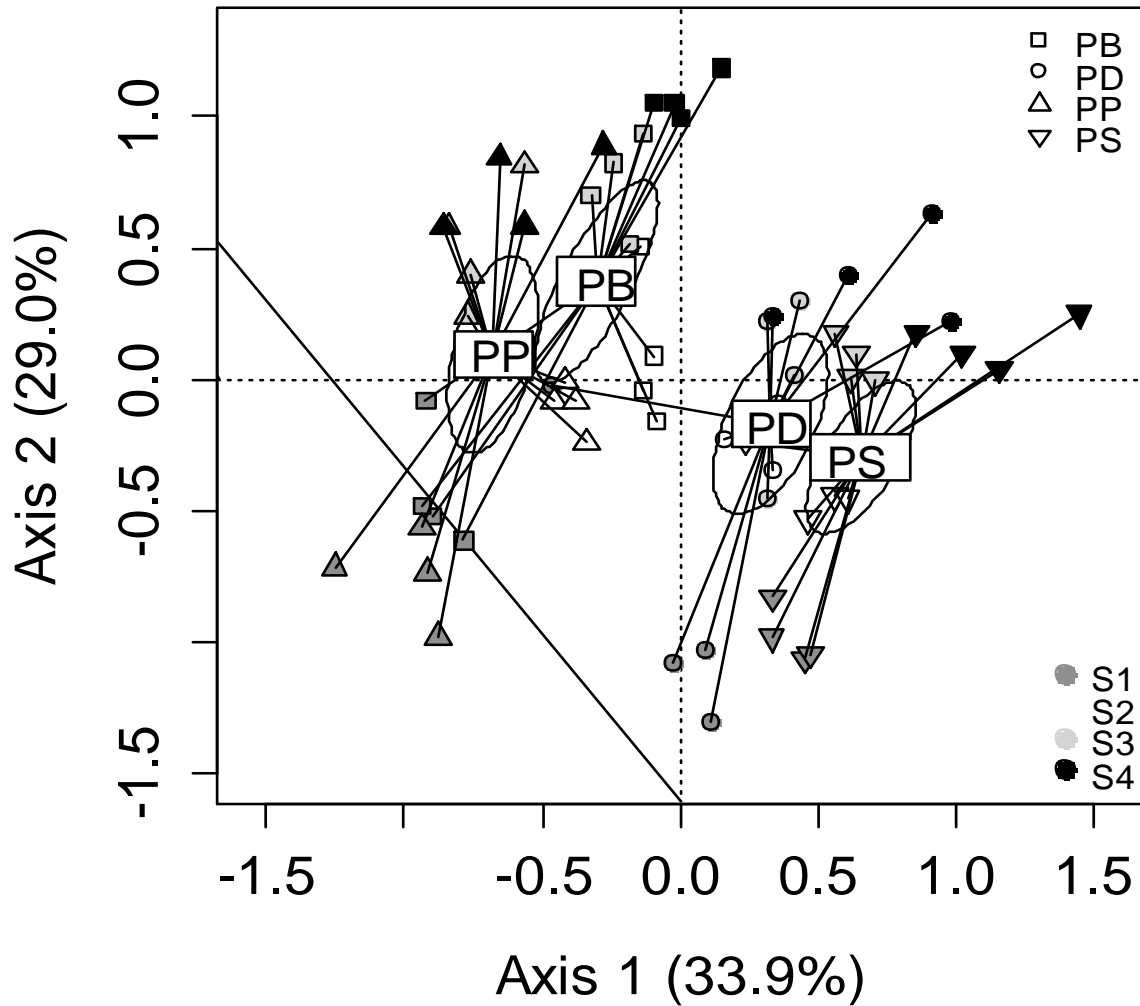


Results

Weather conditions

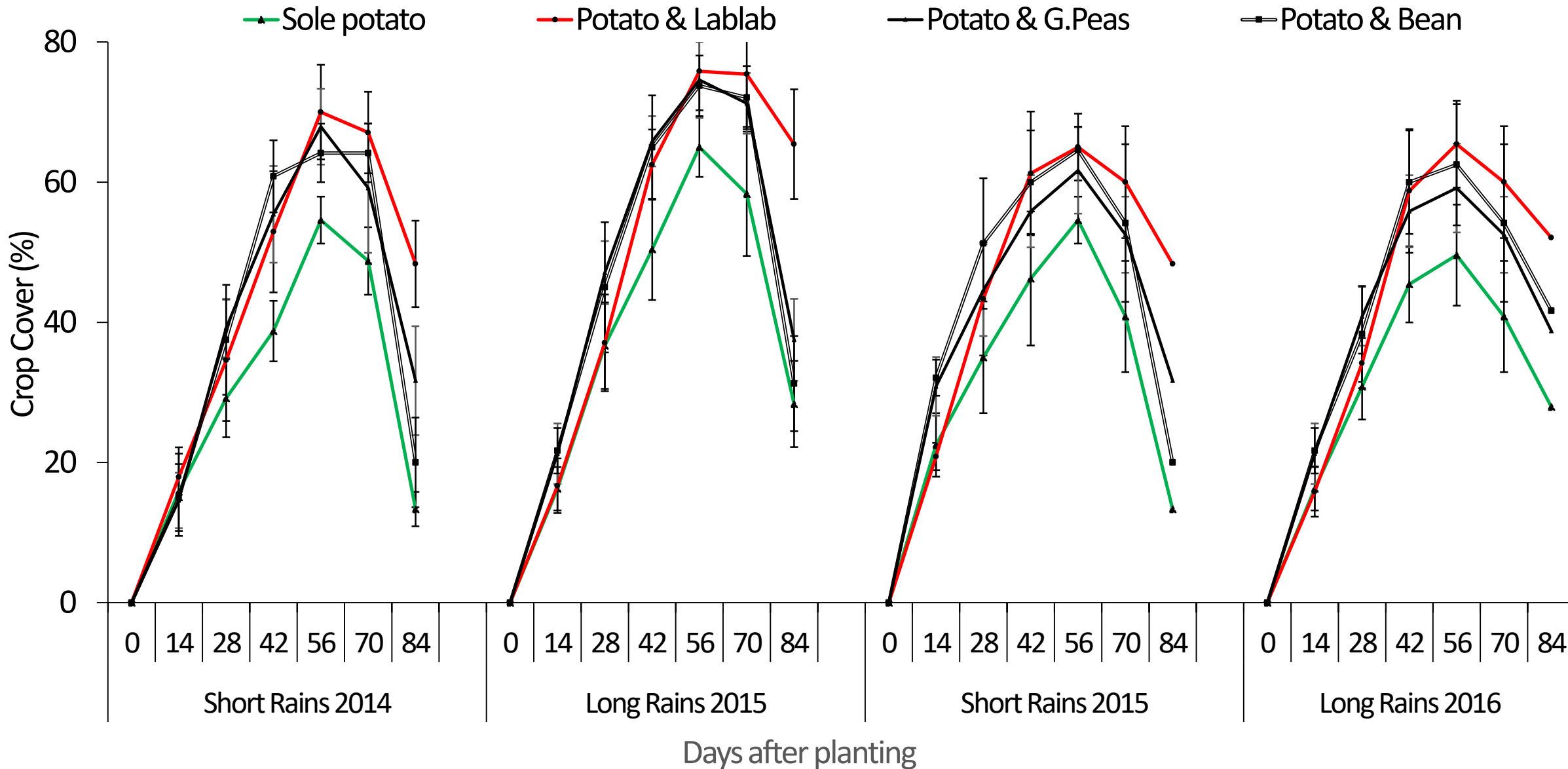


Results

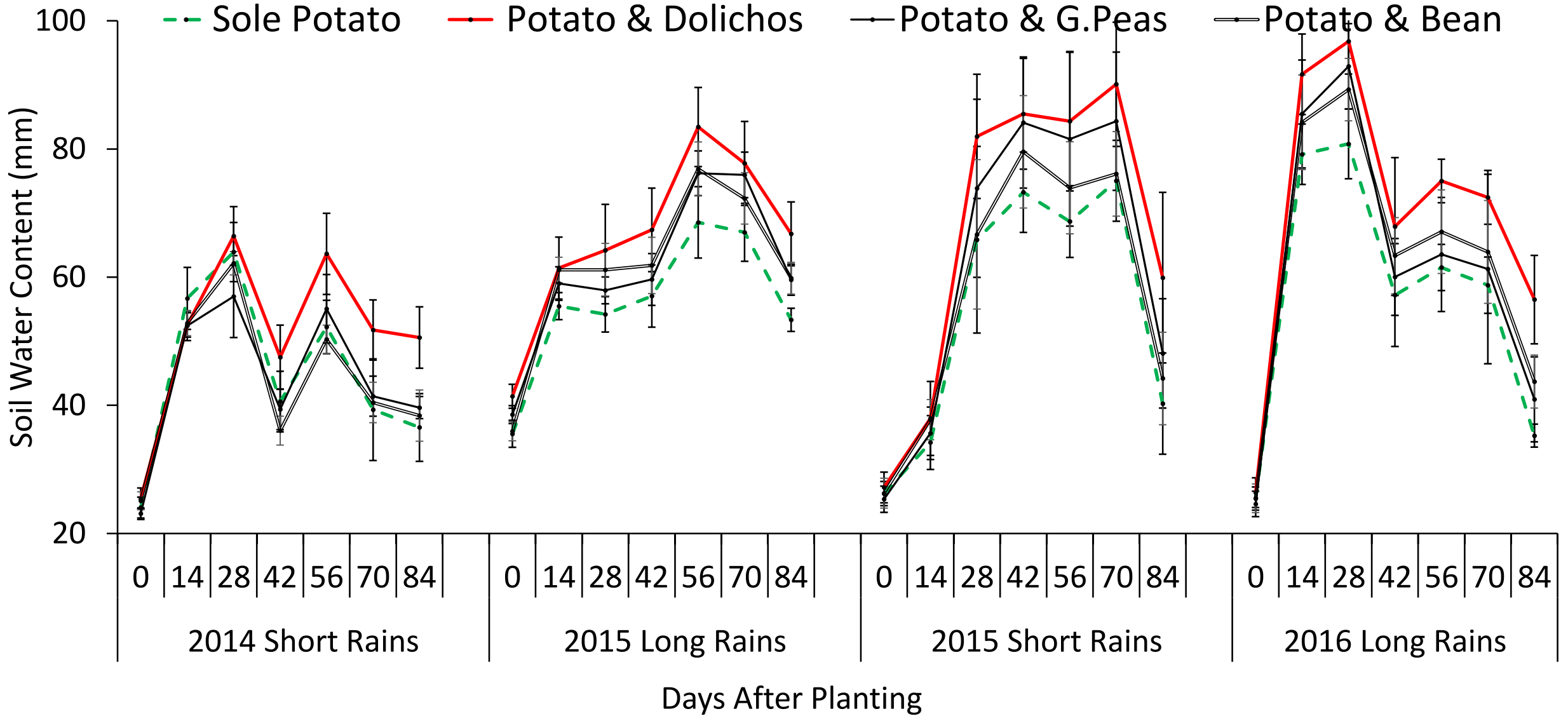


Projection of the cropping systems and seasons on PCA1/2

Ground cover



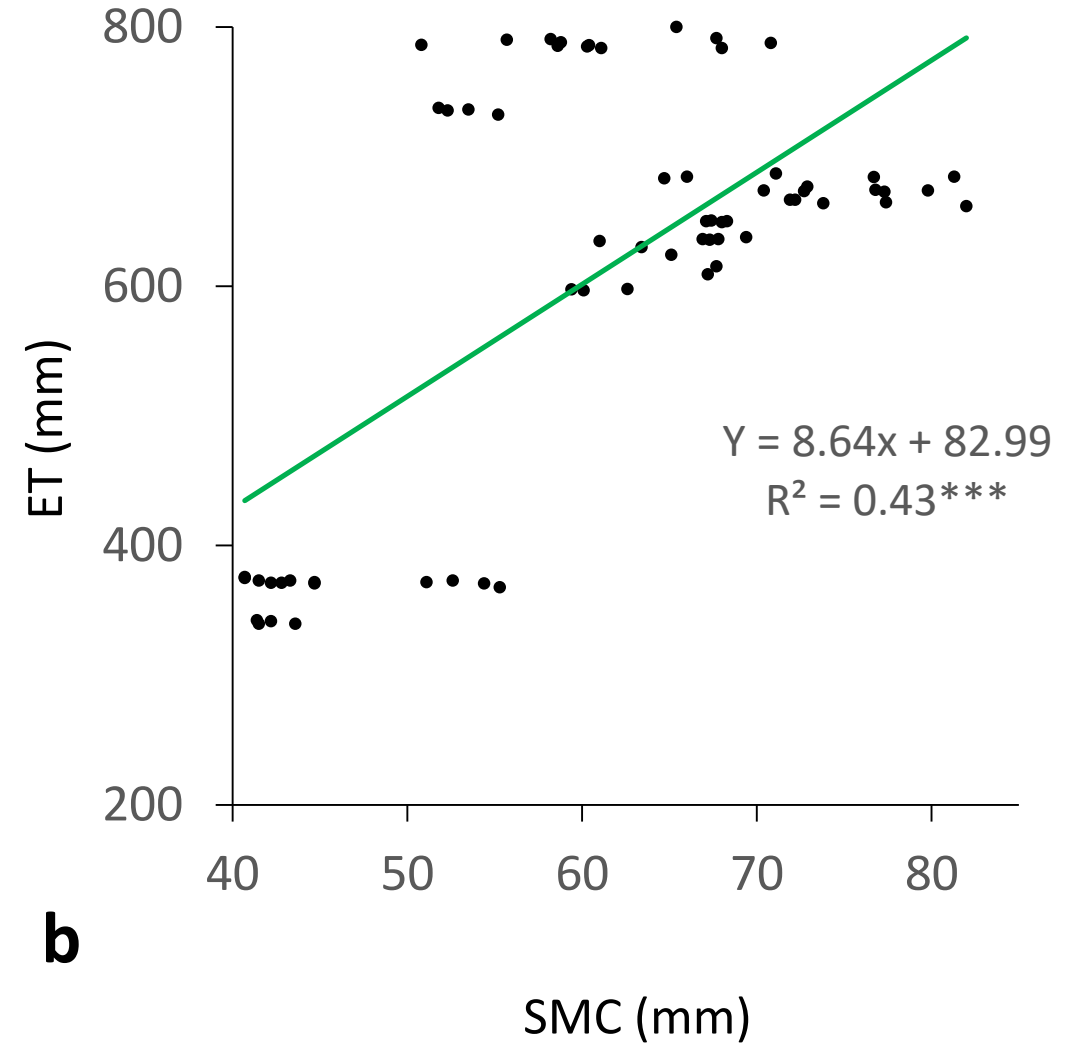
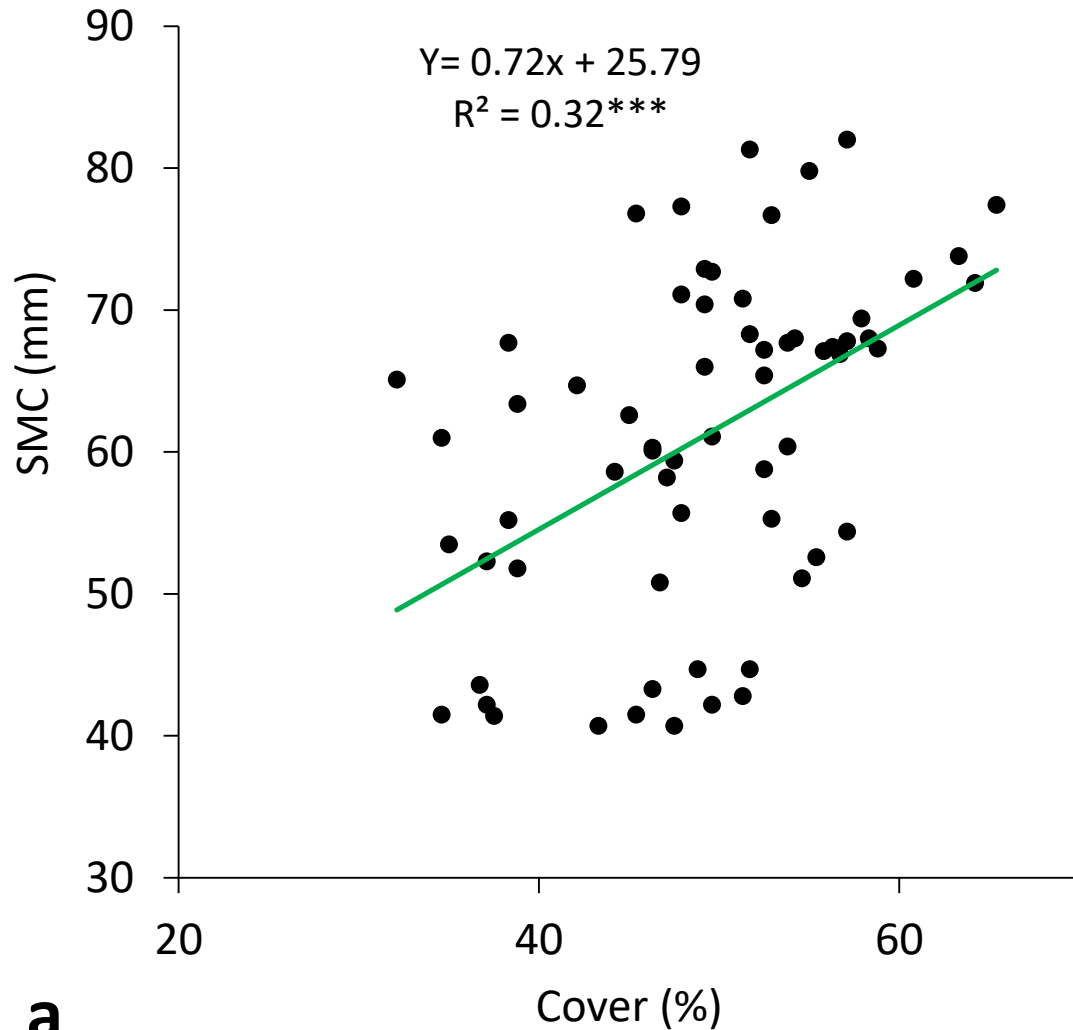
Soil moisture content



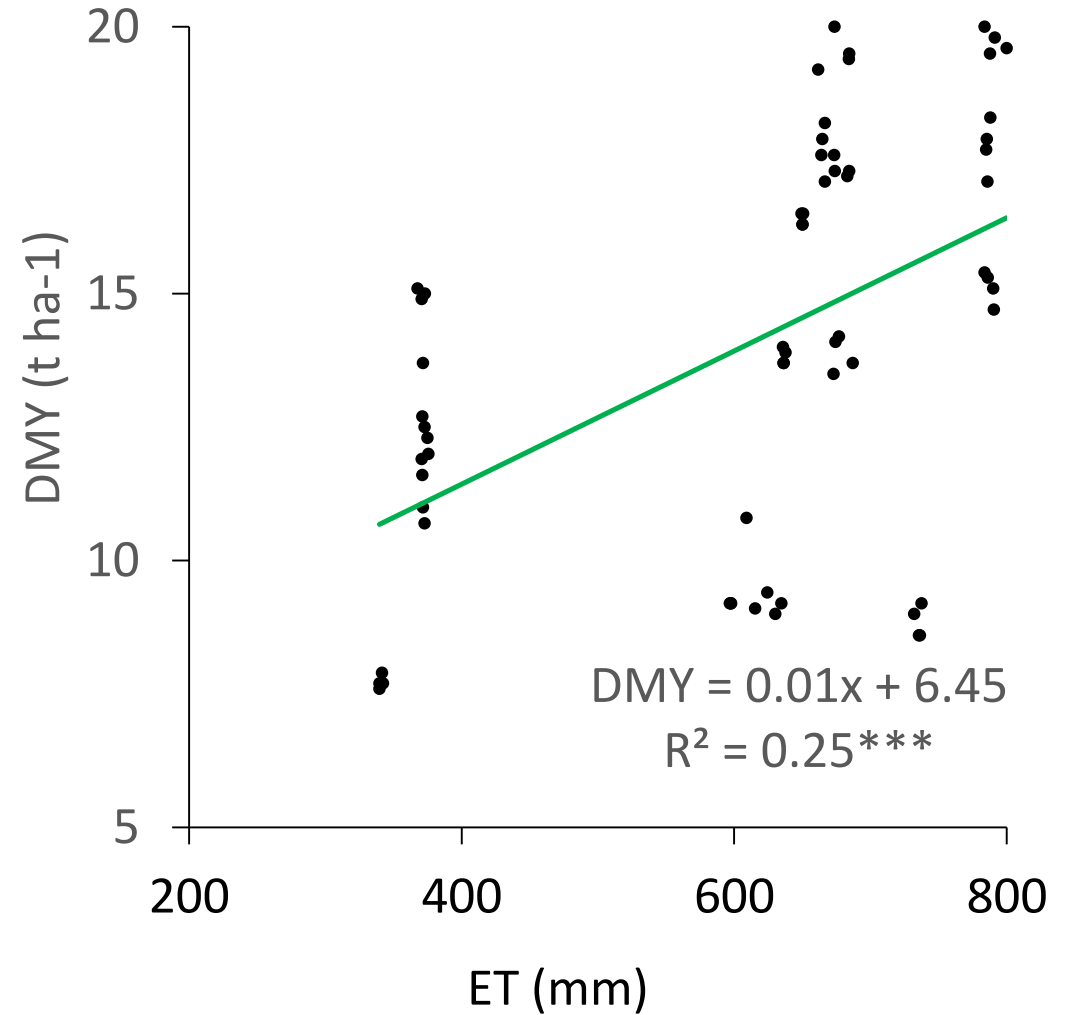
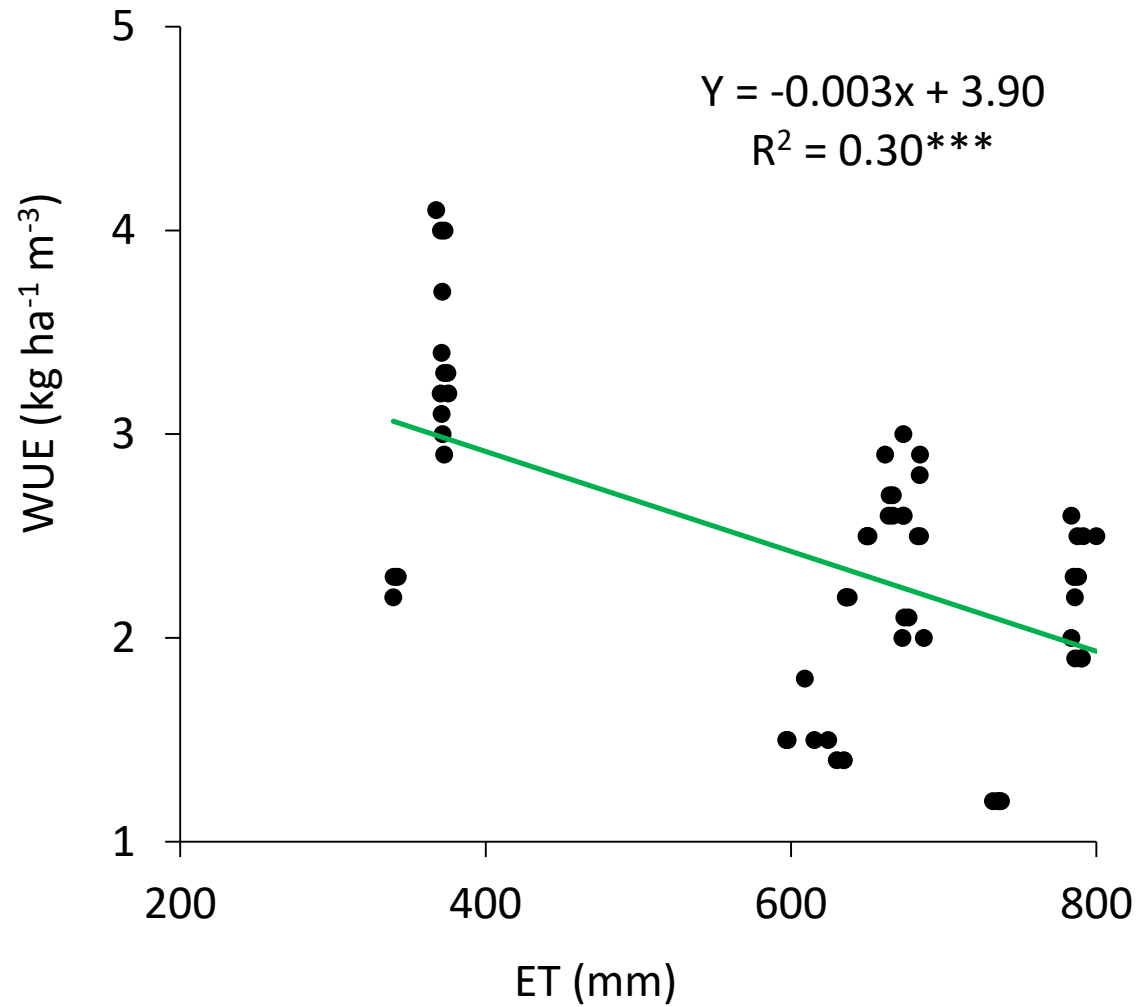
Fresh/dry matter tuber yield, cumulative dry matter yield, ET and WUE.

Treatment	Fresh tuber yield (t ha ⁻¹)	Dry matter tuber yield (t ha ⁻¹)	Total DMY (t ha ⁻¹) Potato & legumes	Evapotranspiration (mm)	Water use efficiency (kg ha ⁻¹ m ³)
Potato	36.8 c	6.5 c	8.7 a	575 a	1.6 a
Potato + Dolichos	34.5 c	6.2 c	17.9 d	626 b	3.0 d
Potato + G. pea	24.6 a	4.4 a	13.5 b	618 b	2.3 c
Potato + Bean	30.5 b	5.4 b	16.0 c	622 b	2.7 b

Relationship Between Variables



Relationship Between Variables...



Conclusion

- The study demonstrates the practicality of intercropping potatoes with legume cover crops.
- *Dolichos lablab* was the best in cover development and soil moisture conservation, competing less with potato for water enhancing water WUE and potato productivity.
- Further study on spatial and temporal arrangements of the components crops. Upscaling is also recommended.

Acknowledgements



THANK YOU

