

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
155

4 authors, including:



Harun Gitari
Kenyatta University
12 PUBLICATIONS 50 CITATIONS

[SEE PROFILE](#)



Charles Gachene
University of Nairobi
105 PUBLICATIONS 771 CITATIONS

[SEE PROFILE](#)

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



cover crops and herbicide resistant maize [View project](#)



soil and water [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.

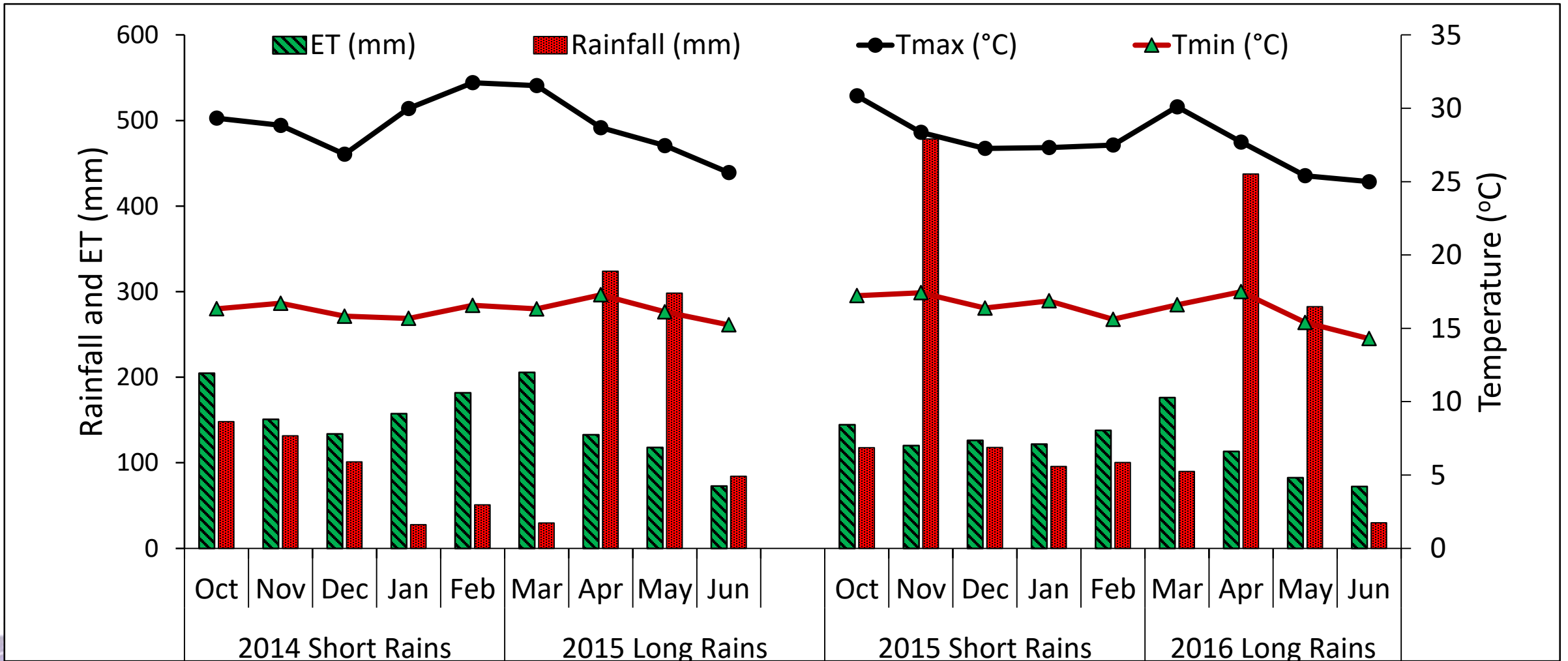
Results

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

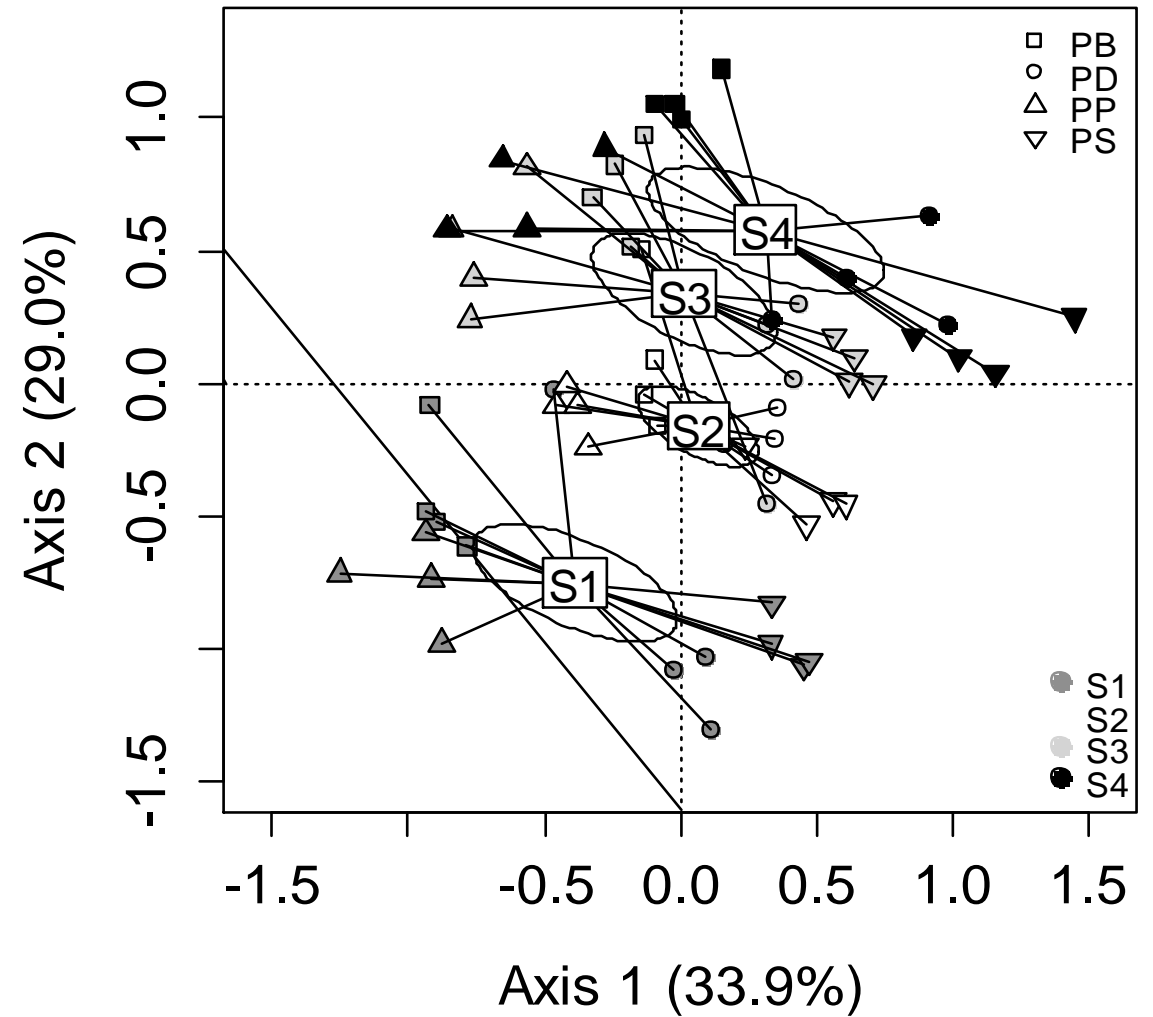
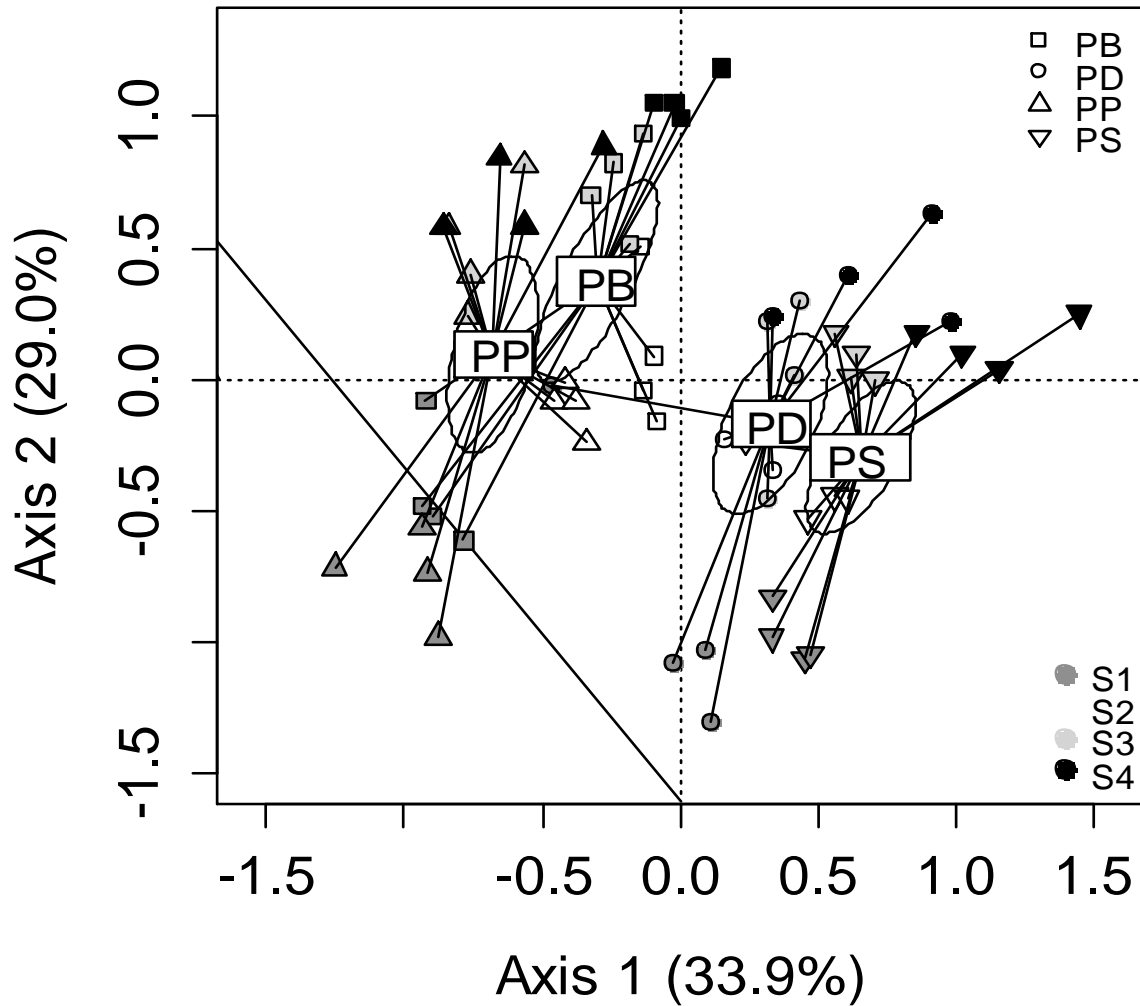


Results

Weather conditions

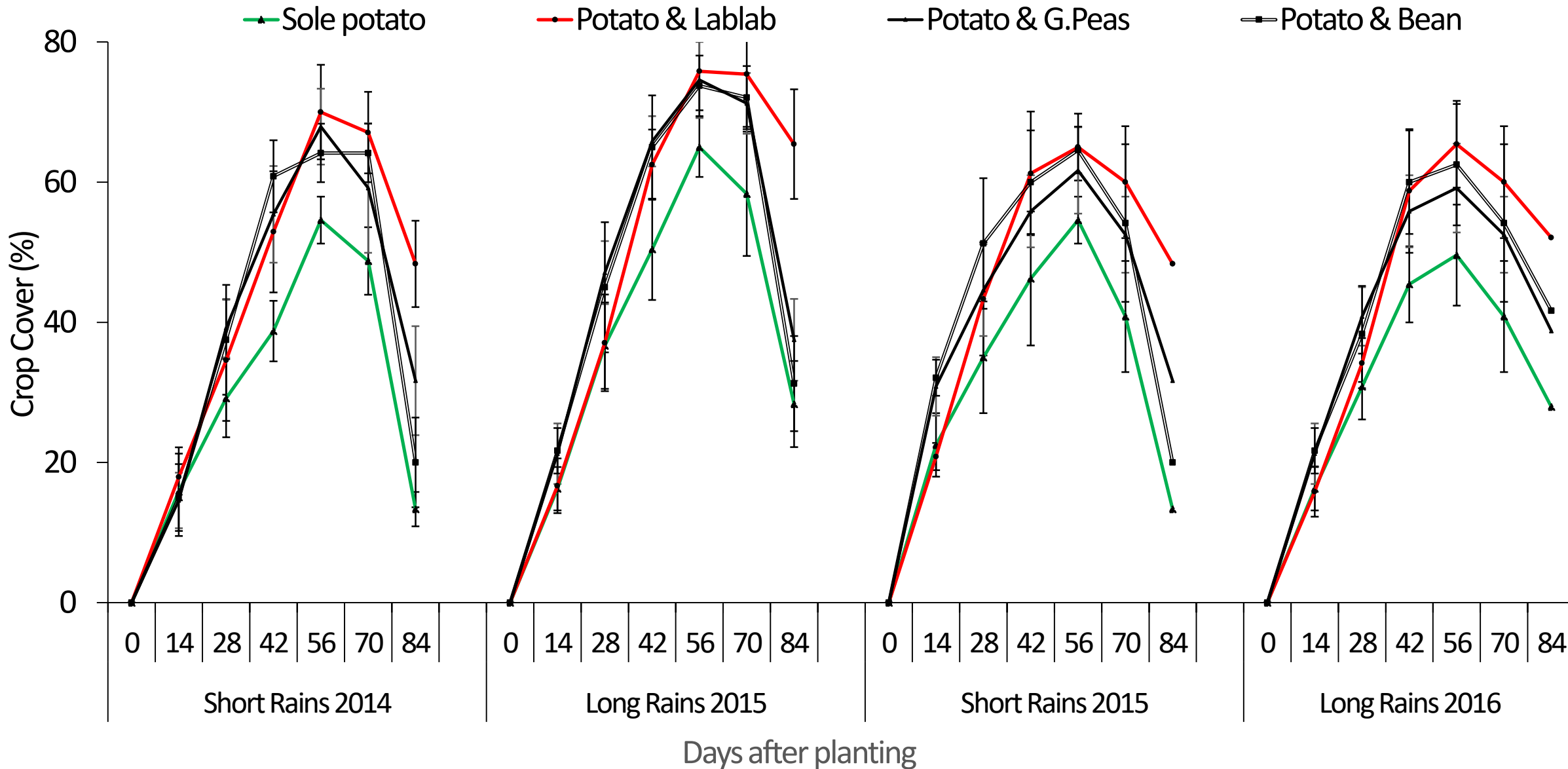


Results

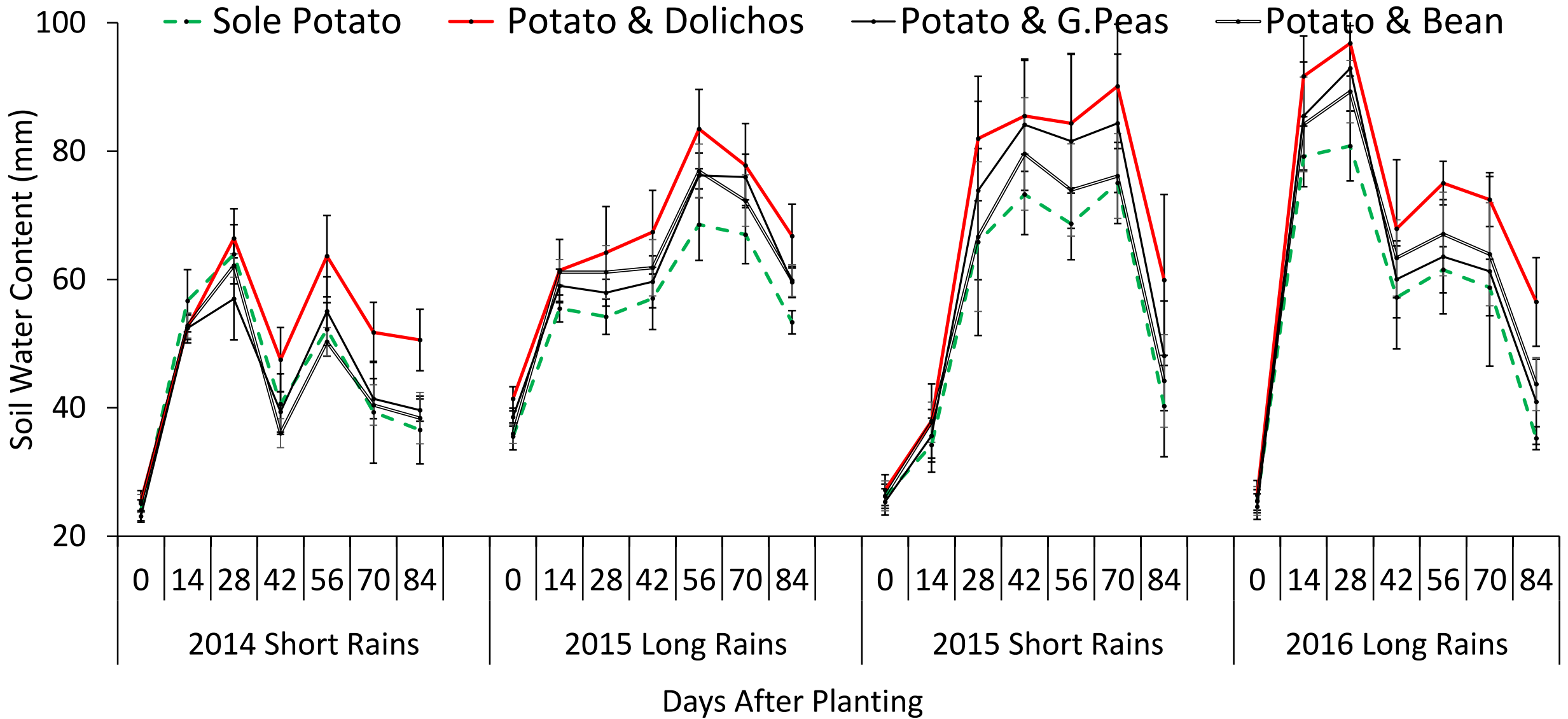


Projection of the cropping systems and seasons on PCA1/2

Ground cover



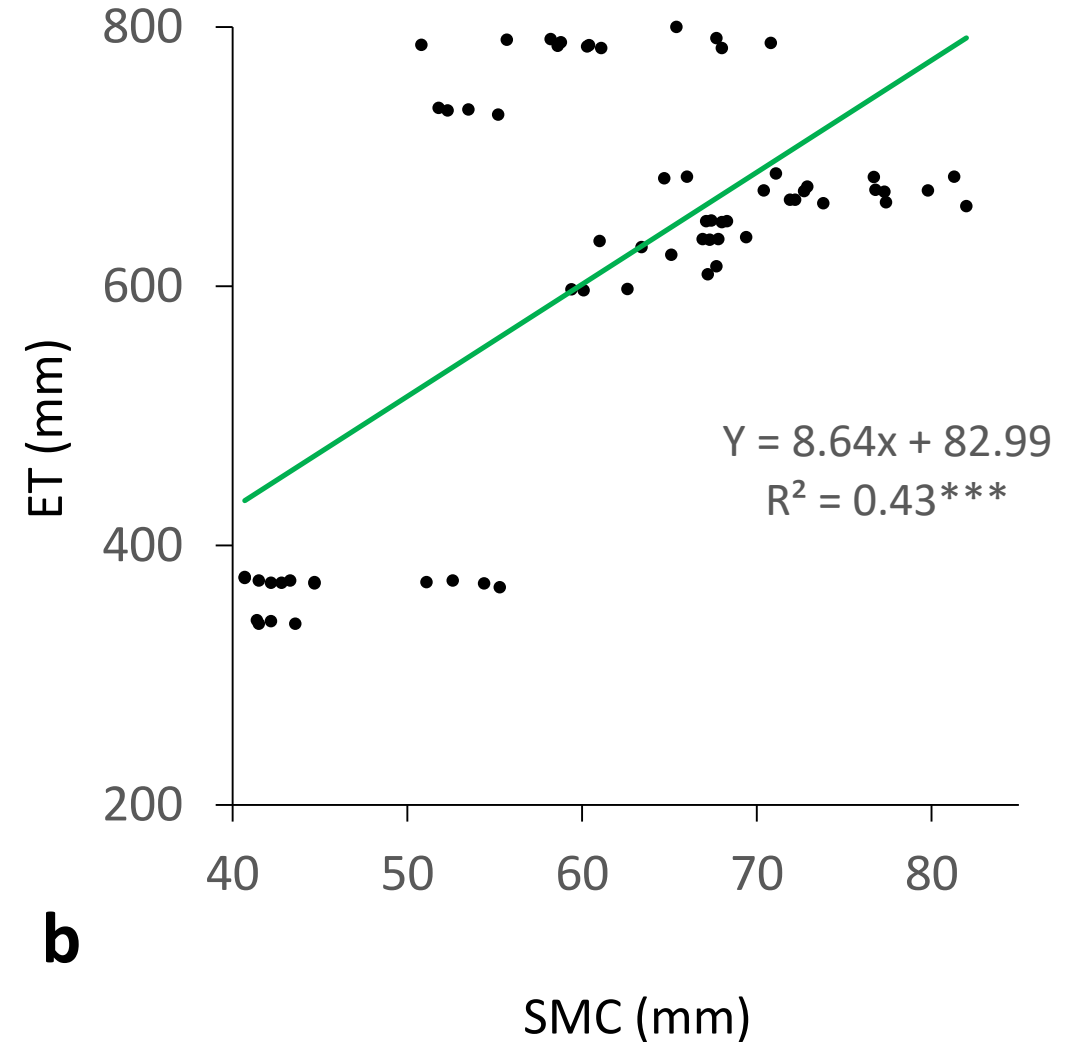
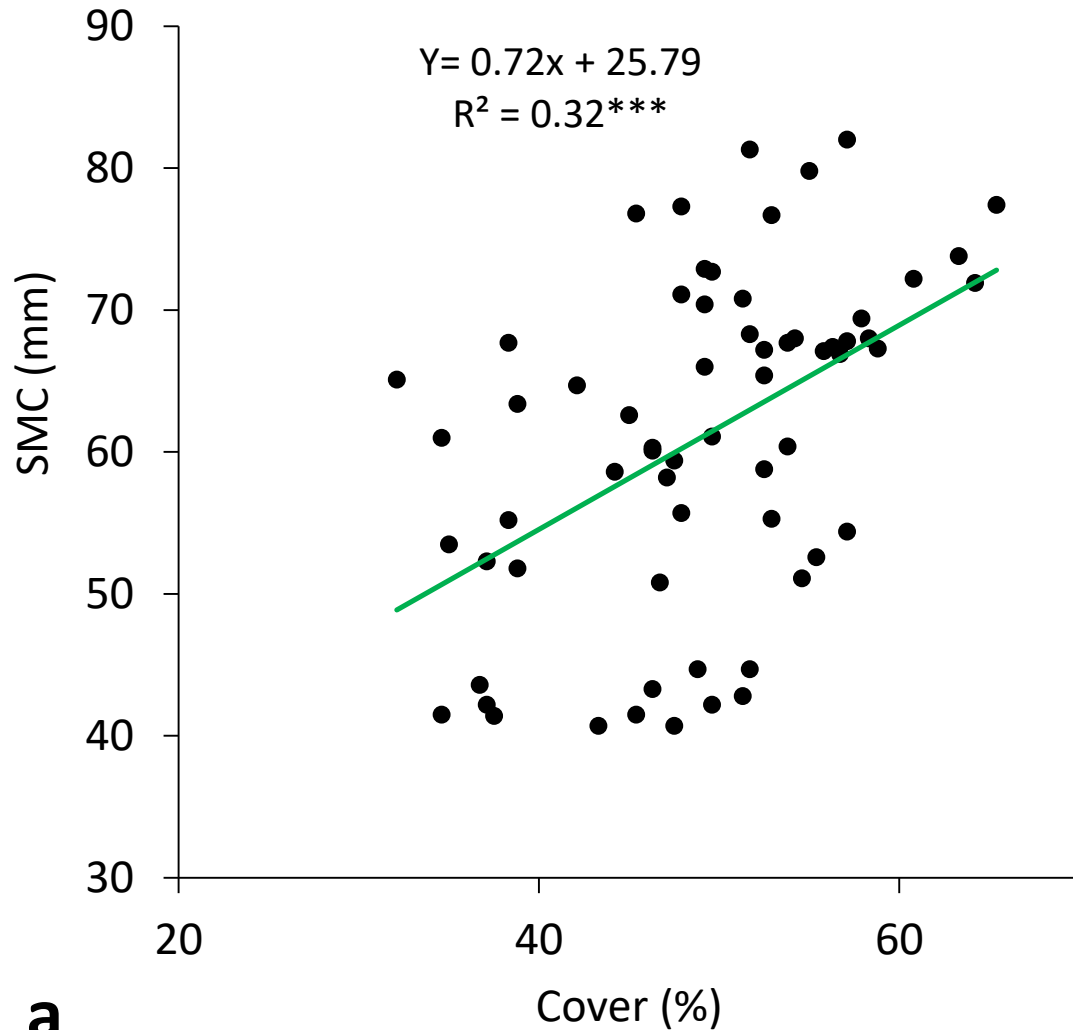
Soil moisture content



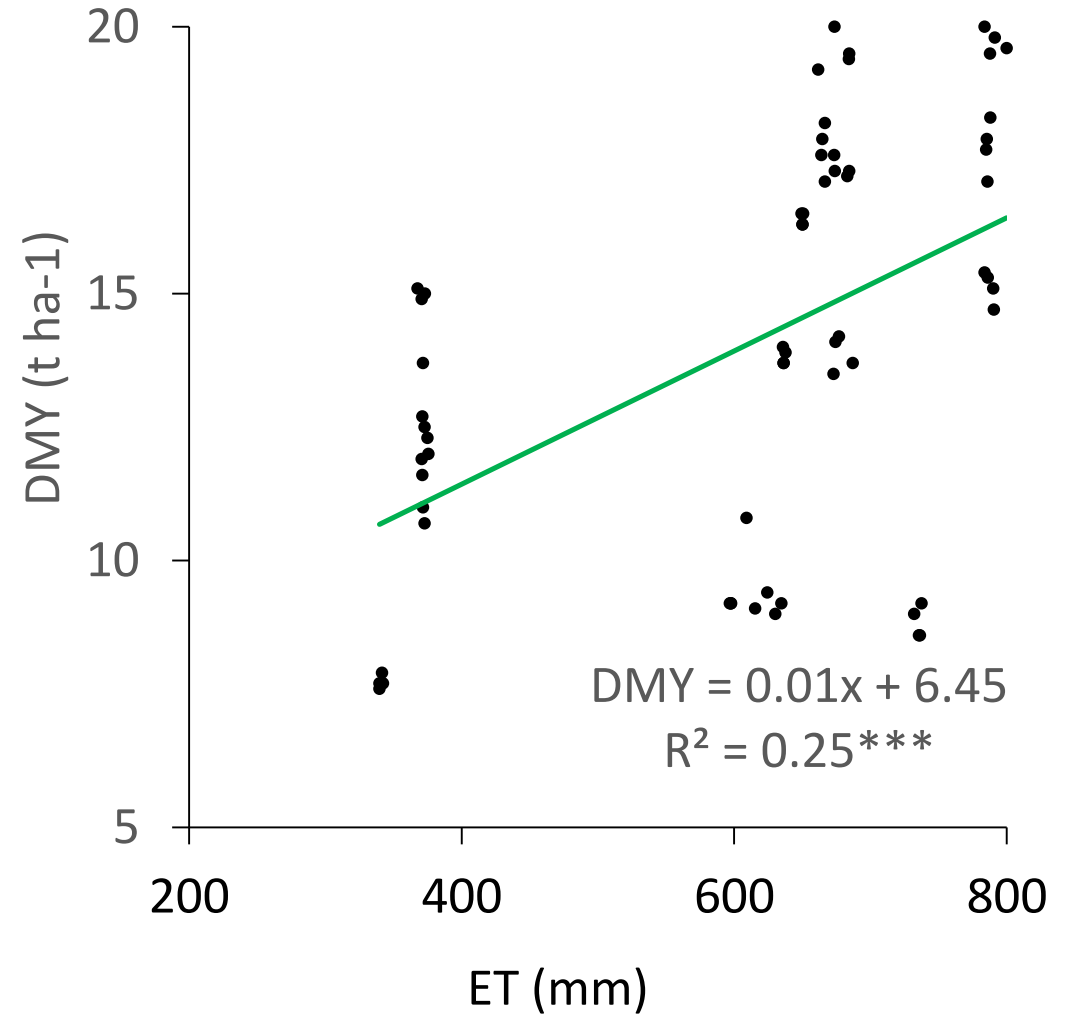
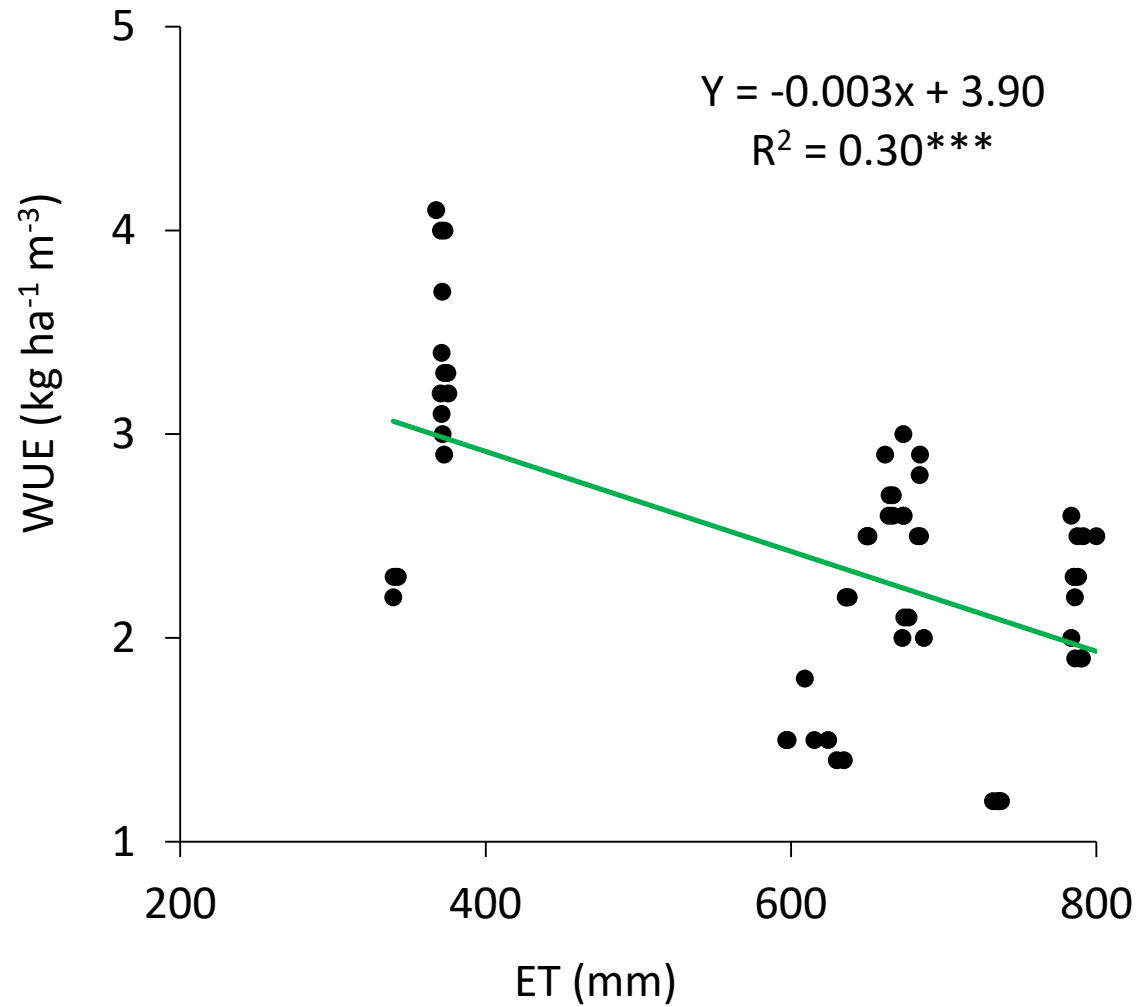
Fresh/dry matter tuber yield, cumulative dry matter yield, ET and WUE.

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

