

THE BLUE WATER FOOTPRINT AND THE WATER USE EFFICIENCY OF POTATO (*SOLANUM TUBEROSUM*): A CASE STUDY OF SANDVELD REGION, SOUTH AFRICA

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OUTLINE

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BACKGROUND

- Globally water resources are threatened due to increase in population growth, climate change, and desertification, global warming (Stephenson et al, 2004).
- It is estimated that by 2020 approximately 75% of the world's population will live in areas experiencing physical or economic water scarcity (Molden et al. 2003).
- Water footprints have been proposed as being suitable indicators for quantifying the impact of goods and services on freshwater scarcity and quality.

BACKGROUND



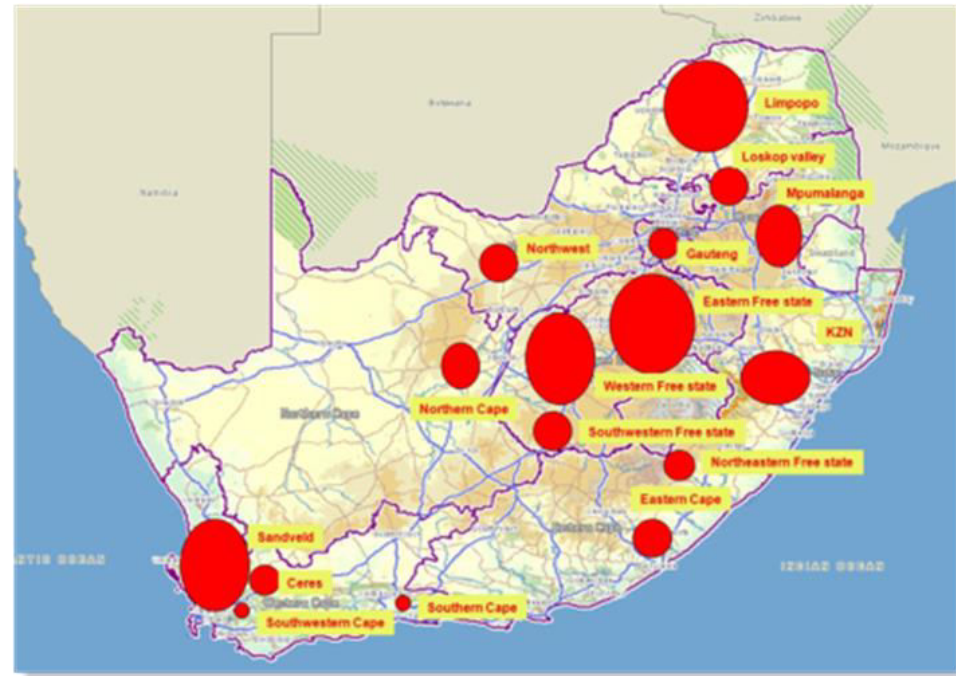
The total water footprint components (picture source: www.raw.info)

OBJECTIVES

- To determine the blue water footprint and the water use efficiency of potatoes grown within the Sandveld Catchment.

STUDY AREA

- Sandveld Catchment is located in the West Coast of SA.
- It is characterized by semi-arid Mediterranean climate.
- It receives between 150mm-250mm of rainfall per annum.
- Crops grown in the catchment include potatoes and wheat.



Potato producing regions in SA (source: potato SA)

METHODOLOGY

- $BLUE\ WF = (ET_{blue} + \text{Indirect water use}) / \text{Yield}$
- $ET_{blue} = K_c * ET_o$

Where K_c is standard crop coefficient derived from the FAO 56 manual and ET_o is the reference evapotranspiration calculated following the Penman Monteith equation.

METHODOLOGY

- Indirect water used in the farm was collected through interviews with farmers and through field measurements.
- Field measurements were taken using a flow meter.
- Potato yield was also derived through interviewing farmers



RESULTS

Water-use Component	Modderfontein Farm	Sandberg Farm	Riviera Farm
Crop (ET)	630.0	538	501
Spraying Micronutrients	0.7	0.7	0.7
Spraying Fungicides	0.8	0.8	0.8
crop Washing	4.6	4.6	4.6
Packhouse Water-use	3.8	3.8	3.8
Other	0.8	0.8	0.8
Total	640.7	548.7	511.7

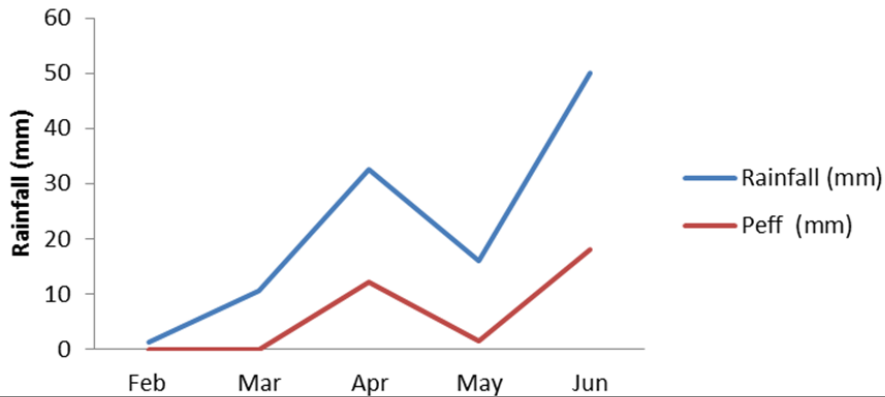
The WF of summer potatoes was between 120 Litres/kg – 133Litres/kg while the WUE was 8kg/m³.

CONCLUSION

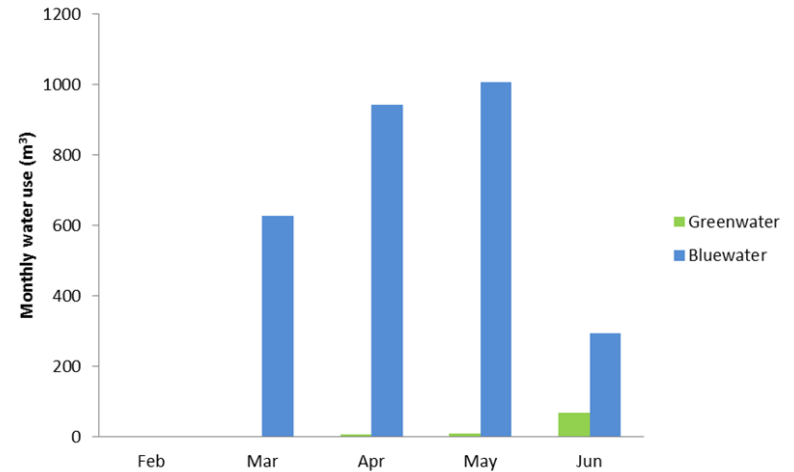
- WF values are affected by the method used to estimate ET as it contributes over 90% to the total water footprint. Field measurements of ET or locally derived crop coefficients should be used where possible.
- Water availability estimates are not available per farms therefore estimating the water footprint according to Hoekstra et al.2011 was a challenge.
- ✓ WSI= 0.46%
- Summer potato production in the catchment was sustainable

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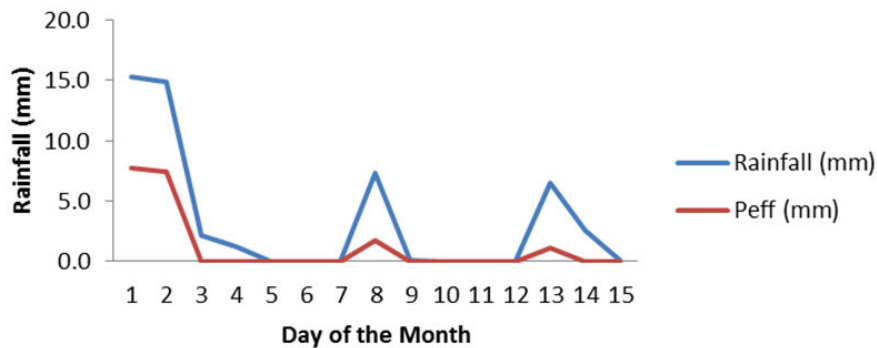
Effective rainfall and rainfall at Modderfontein Farm



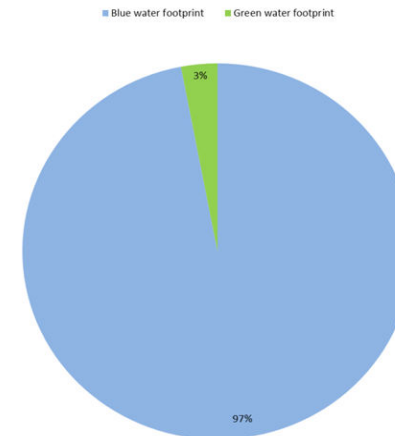
Monthly water use (m³/ha⁻¹) of potatoes



June daily rainfall (mm) and effective rainfall (mm) at Modderfontein Farm



Water footprint of Potatoes



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Water-use Component	Depth (mm)
Blue water use (ET)	286.0
Spraying Fungicides	0.7
Spraying Pesticides	0.8
Potato Washing	4.6
Packhouse Water-use	3.8
BLUE Total	296

The total blue water footprint of potatoes was 64 litres/ kg and the water use efficiency was 15kg/m³

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