



Winery water footprint assessment: a Portuguese reality

A. Saraiva, C. Jorge, I. Dias, A. Oliveira, P. Oliveira e Silva, M. Oliveira

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What is Water Footprint?

Water Footprint

“The water footprint is a measure of humanity’s appropriation of fresh water in volumes of water consumed and/or polluted.” (WFN, ND)



Green Water Footprint

Blue Water Footprint

Grey Water Footprint

OVERVIEW



Green Water Footprint

Precipitation water that is stored in soil and evaporated, transpired or used by plants.

Blue Water Footprint

Surface or groundwater that is either evaporated, incorporated or taken from one body of water and returned to another.



Grey Water Footprint

Amount of fresh water that is necessary to **assimilate pollutants** to meet water quality standards.

WineWATERFootprint

Project Goal

Characterize
Water Consumption Patterns



In order to

Prevent and Mitigate
future losses associated to water stress



WineWATERFootprint Project

Objectives:

- **Evaluate** cross-cutting broad spectrum **technologies**
 - To **reduce** water demand
 - To assess the uniformity of water distribution and application efficiency in vineyard
 - To determine the water use during wine production
- **Assess water footprint** sustainability
 - To identify **hotspots**
 - Define **strategies** to reduce water footprint by 10%



Consortium

Research Institutions:



Winegrowers:



Companhia das Lezírias

Consultants:



Tasks

Task coordinator:

Task 1 – Project management



Task 2 – Vineyard monitorization



Task 3 – Winery monitorization



Task 4 – Water footprint sustainability



Task 5 - Dissemination



Activity 1: Project Management

Activity 2: Water Footprint
assessment at vineyard

Activity 3: Water Footprint
assessment at winery

Activity 4: Sustainability assessment of Water footprint for wine
chain

Activity 5: Dissemination

Tasks



Task 3 – Winery monitorization

- **Account blue water footprint**
 - best available technics (BATs)
 - water counters at key points
- **Account grey water footprint**
 - wastewater flow quantification and characterization
- **Water footprint assessment**

$$WF_{proc} = WF_{proc,green} + WF_{proc,blue} + WF_{proc,grey} \quad [\text{volume/mass}]$$

$$WF_{prod}[p] = \frac{\sum_{s=1}^k WF_{proc}[s]}{P[p]} \quad [\text{volume/mass}]$$



Pegada Hídrica na Adega



Adega I:
1 000 t de uva processada

Pegada hídrica:

Azul – Furo de captação

Cinzenta – Tratamento + rega



Sistema de Tratamento

Tanque de equalização
+
Reator aeróbio microbolhas
↓
regá



Adega II:
1 250 t de uva processada

Pegada hídrica:

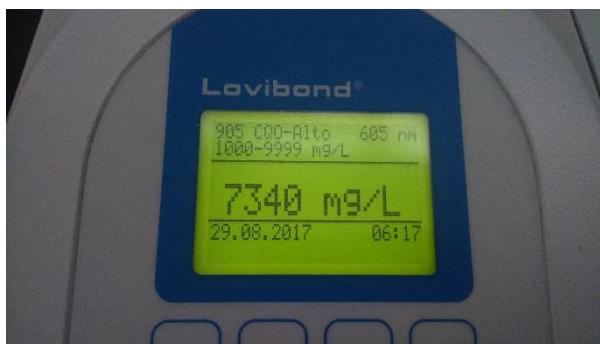
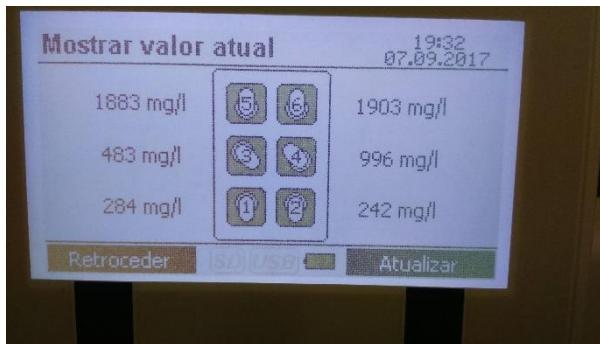
Azul – Furo de captação +
água da rede

Cinzenta – Tratamento + rega

Sistema de Tratamento

Tanque de equalização
+
Lagoa de evaporação
↓
regá

Pegada Hídrica na Adega





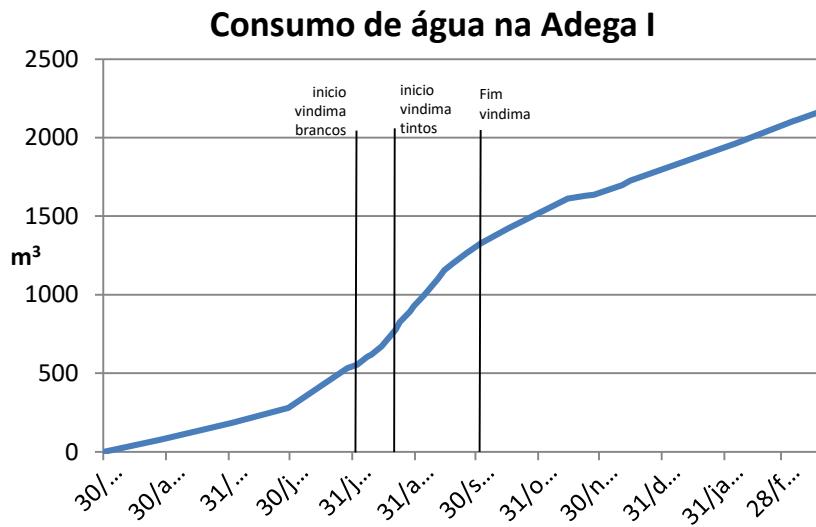
WineWaterFootprint

Pegada Hídrica na Adega

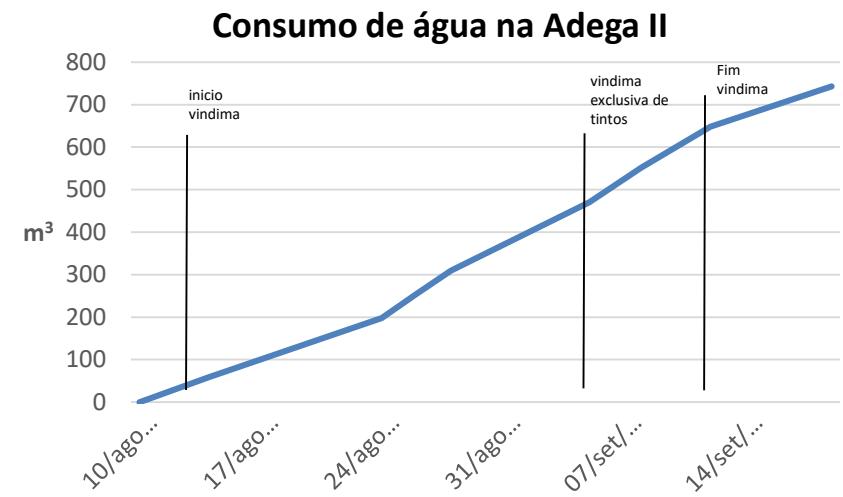


Pegada Hídrica Azul

Adega I:



Adega II:



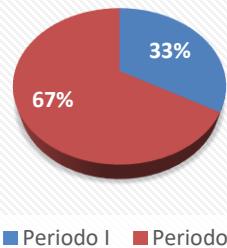
Pegada Hídrica na Adega



Pegada Hídrica Azul

Adega I:

Consumo de água Adega I



Período I – vindima e 1^a trasfega **Período II** – restantes operações

Indicador de consumo - Período I (60 dias)

$$IC = \frac{746,10 \times 10^3 L}{723\,947 L} = 1,03 \text{ L água / L vinho}$$

Indicador de consumo - Período II (305 dias)

$$IC = \frac{1\,496,17 \times 10^3 L}{723\,947 L} = 2,07 \text{ L água / L vinho}$$

Adega II:

Período I – vindima e 1^a trasfega **Período II** – restantes operações

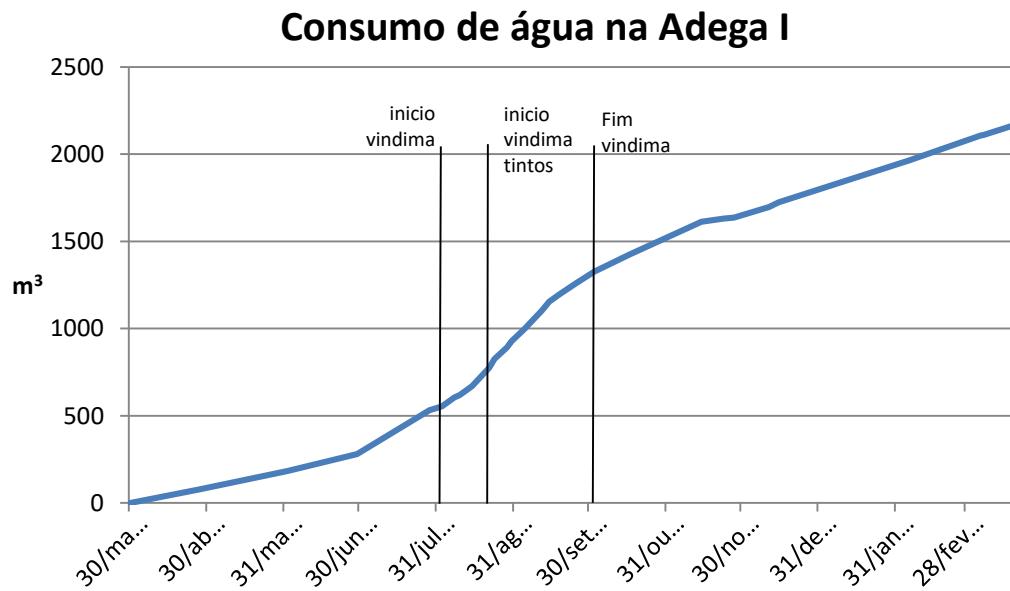
Indicador de consumo - Período I (60 dias)

$$IC = \frac{878,14 \times 10^3 L}{947\,250} = 0,93 \text{ L água / L vinho}$$

Pegada Hídrica na Adega



Pegada Hídrica Azul



Consumo anual:

$$IC = \frac{2\,242,27 \times 10^3 L}{723\,947 L}$$

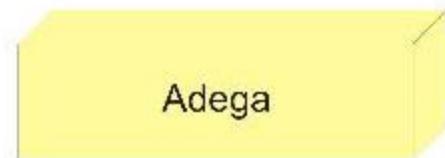
$$IC = 3,1 \text{ L}_\text{água} / \text{L}_\text{vinho}$$



Pegada Hídrica na Adega



Pegada Hídrica Cinzenta



↓
> tratamento

↓
< tratamento

$$PH_{cinzenta} = \sum_{n=1}^{12} \left(\frac{L_n}{C_{máx} - C_{nat}} \right) (volume/tempo)$$

Pegada Hídrica na Adega



872 L_{água} / L_{vinho}



Global average water footprint

109 litre for a 125ml glass of wine

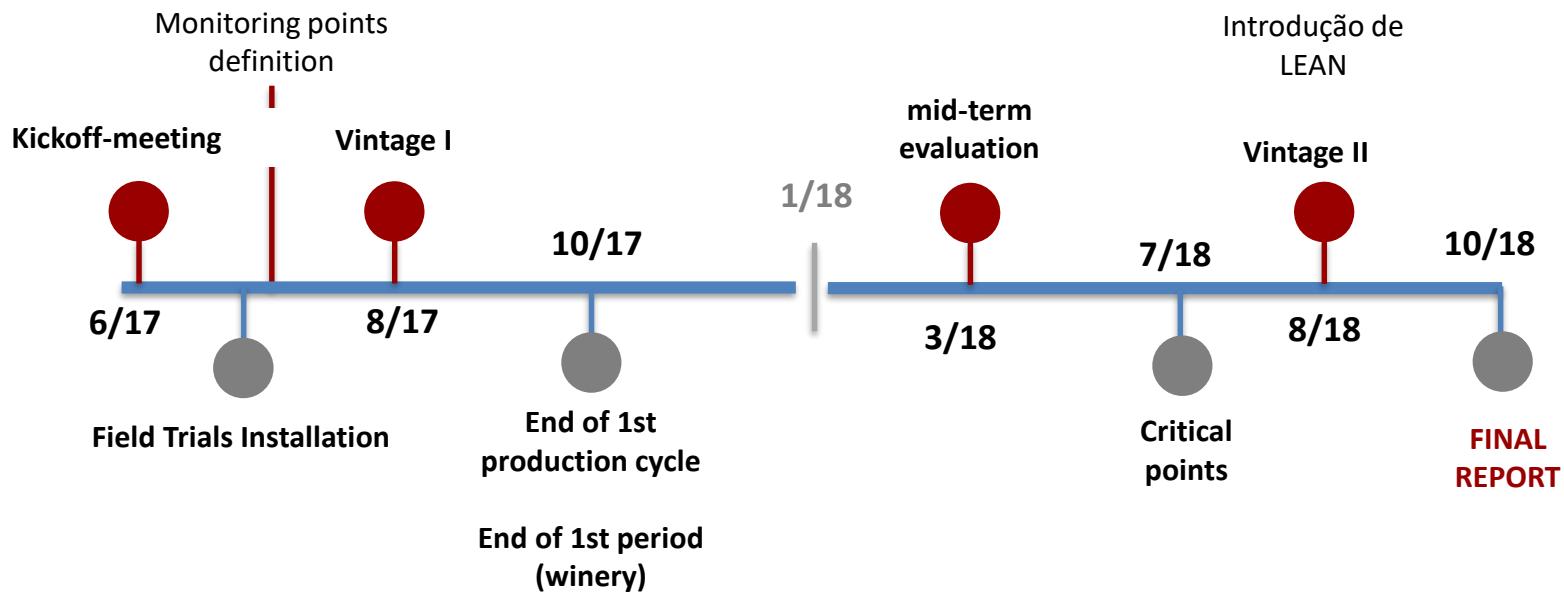
70% green, 16% blue, 14% grey



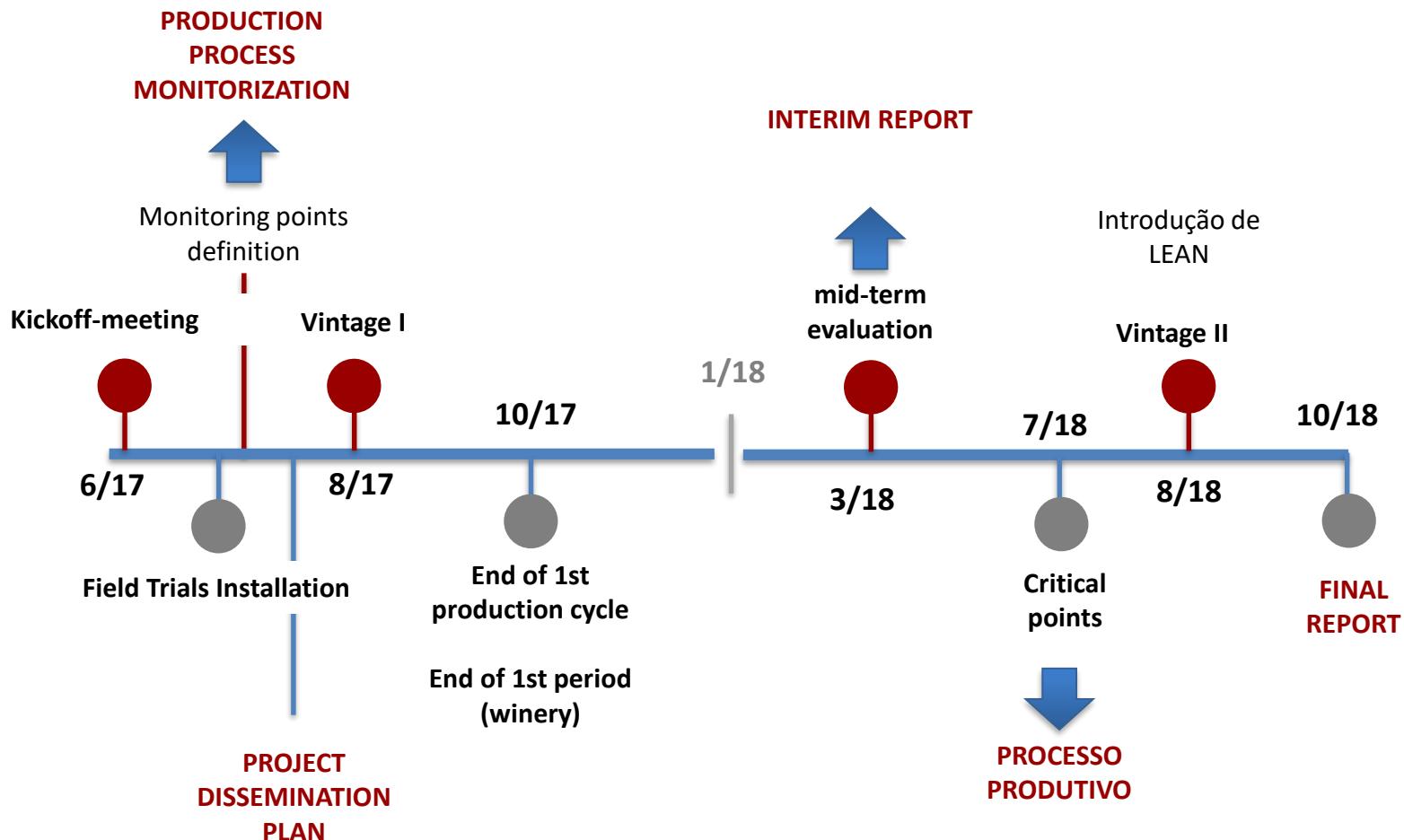
Hoekstra et al., 2011



Timeline



Timeline



Thank you

artur.saraiva@esa.ipsantarem.pt

