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### ► **To cite this version:**

Succès Malundama Kutangila. Determination of the crop coefficient (Kc) for optimal use of water in agriculture. What Is the Future of Water and Public Health?, Dec 2018, Sheffield, United Kingdom. ⟨hal-01979515⟩

**HAL Id: hal-01979515**

**<https://hal.science/hal-01979515v1>**

Submitted on 13 Jan 2019

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# Determination of the crop coefficient (Kc) for optimal use of water in agriculture

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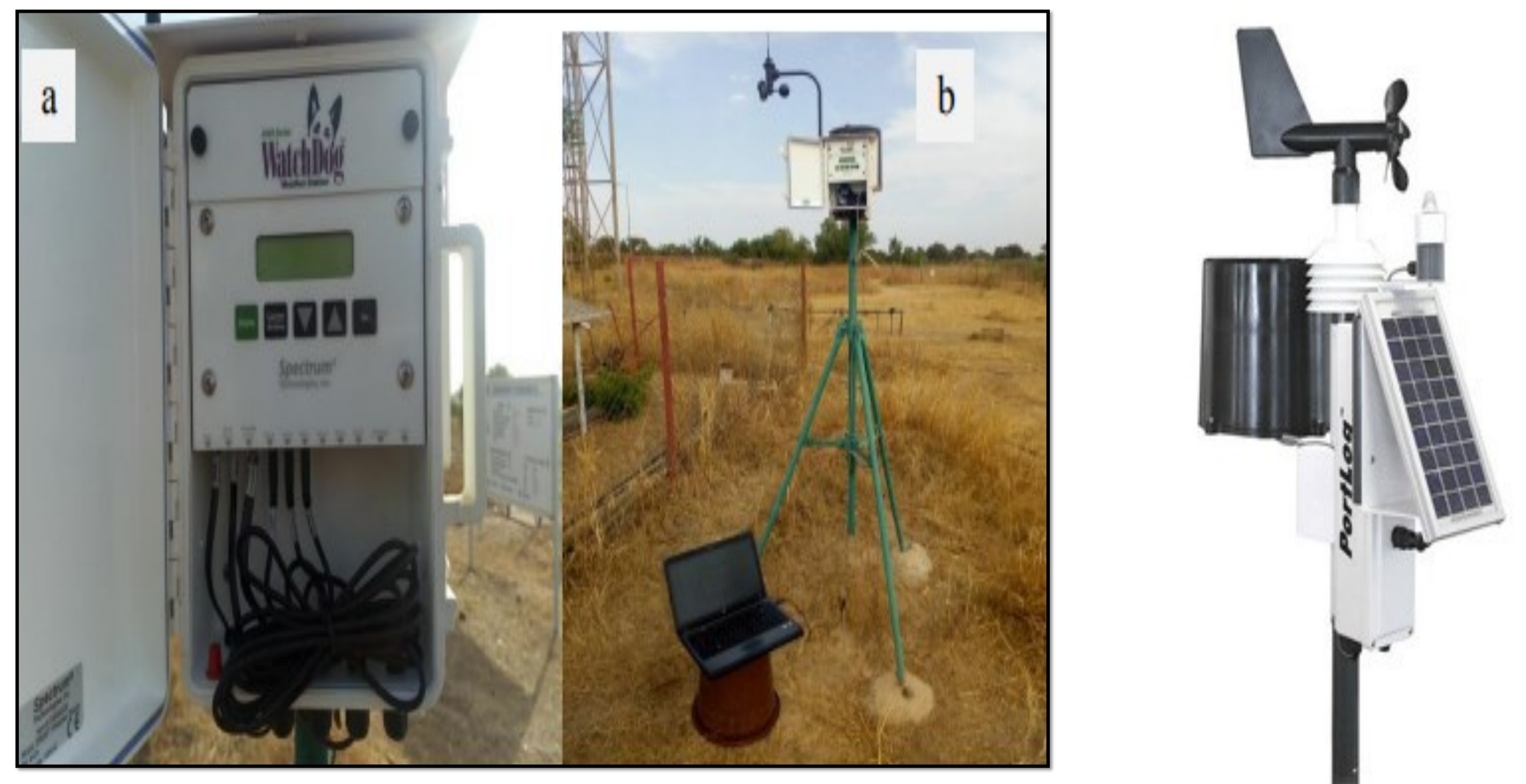
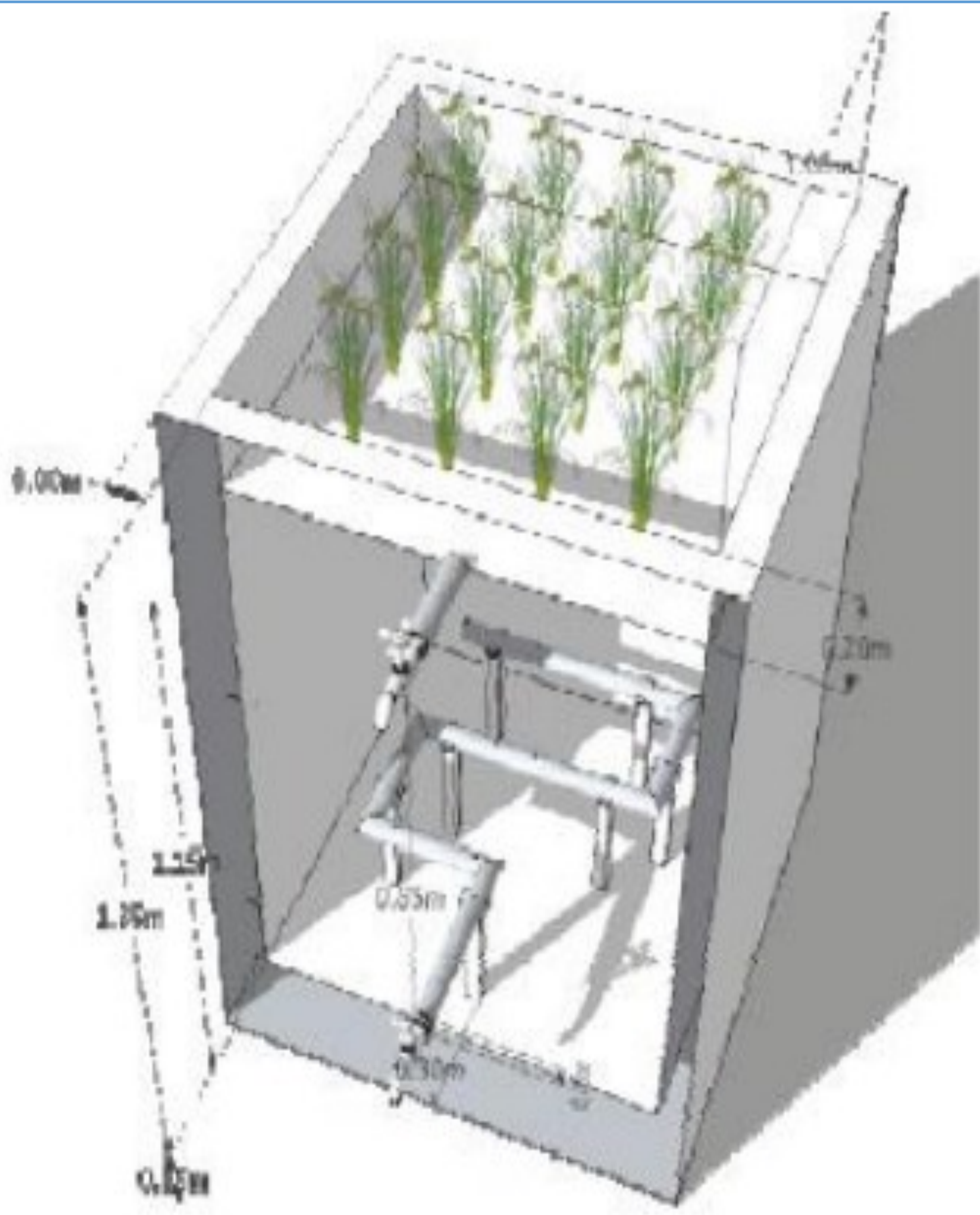
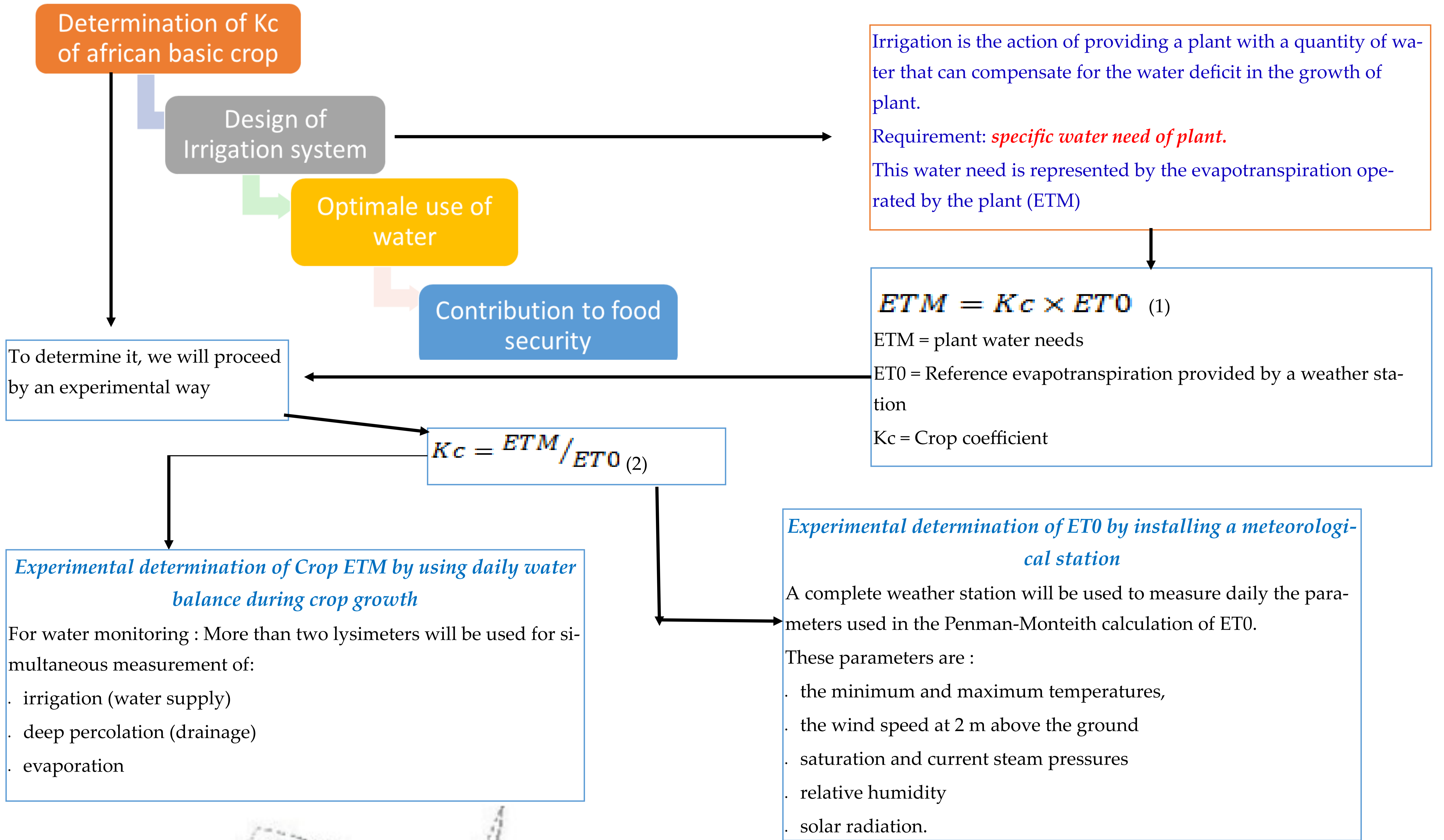
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Presented at the RSPH Conference : « What Is the Future of Water and Public and Health? »

Thursday 13 December 2018 09:30 –17:30 University of Sheffield The Edge, 34 Encliffe Crescent, Sheffield S10 3ED

In a global context of climate change and demographic pressure, the world is facing the scarcity of water resources. This includes the optimal use of this resource in agriculture.

The practice of irrigation and drainage is one of the strategies to be adopted to cope with and adapt to this threat. The determination of the crop coefficient is very important in sizing an irrigation system. Many crops in Africa, especially basic ones (cassava, millet) and other medicinal plants have not yet seen their Kc determined.



## Experimental determination of Crop ETM by using water balance during crop growth

$$P + I = R + D + ETM + \Delta S \quad (3)$$

With P = rain

I = Irrigation, R = Runoff D = drainage,

The plant will be fed by irrigating without rain (P = 0), hence  $\Delta S = 0$

The system will be installed to prevent runoff (R = 0)

So,

$$ETM = I - D \quad (4)$$

## Experimental determination of ET0 by installing a meteorological station

The Penman-Monteith calculation of ET0.

$$ET0 = \frac{0.408\Delta(Rn - G) + \gamma \frac{900}{T + 273} u_2 (es + ea)}{\Delta + \gamma(1 + 0.34u_2)} \quad (5)$$

- ET0: daily reference evapotranspiration (mm / d);
- Rn: net radiation at the culture surface (MJ / m<sup>2</sup> / d);
- G: heat flux exchanged with the soil (MJ / m<sup>2</sup> / d);
- T: average daily temperature (° C);
- u<sub>2</sub>: average daily wind speed measured at 2 meters (m / s);
- es and ea: respectively the saturation vapor pressure and the actual air pressure at the same height (kPa);
- Δ: slope of the saturated vapor pressure curve at temperature T (kPa / ° C);
- γ: psychrometric constant (kPa / ° C);
- 900 coefficient for the reference crop (kg K / kJ) related to the units used in the distribution of variables n̄, cp and ra;
- 0.34: wind coefficient for the reference crop (kg K / kJ) resulting from the ratio rs / ra
- 0.408 inverse of ε̄ = 2.45 MJ / kg.



Fig. 3: Localized and sprinkling irrigation

## References

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