

Screening of a suitable method to estimation of actual evapotranspiration of Rajmash (*Phaseolus vulgaris* L.)

Speaker : M. Kundu



**Department of Agricultural Meteorology and Physics,
Bidhan Chandra Krishi Viswavidyalaya,
Mohanpur-741252, West Bengal**

BACKGROUND:

1. Net sown area of Rajmash shows an increasing trend in the Lower Gangetic Plain (Singhal, 2004).
2. This is a popular dry land crop; however, one supplemental irrigation enhanced its productivity level by 45 per cent (Sarkar et al., 2000).
3. For effective utilization of water resource, **proper estimation of Actual Evapotranspiration** (AET) is crucial (De Tar, 2008).
4. The most commonly used AET estimation methods are **FAO-56 Penman-Monteith** (Alexandris et al., 2008), **depletion method** (Sepskhah and Kashetipur, 1994).
5. Varying irrigation frequencies and phosphate levels influence the yield and evapotranspiration pattern (Kundu et al., 2009)

OBJECTIVES:

To screen the **best method** to quantify the status of AET of rajmash in Lower Gangetic plain.

Study period: Winter season, 2003- 04 and 2004 – 05.

**Location: Central research Farm of the University
(Lat. 22^o58' N, Long. 88^o31' E, Alt.9..75 m amsl)**

Climate: Hot, sub-humid tropic

Air temp: Maximum- 24.6-31.2°C; Minimum- 8.9-15.3°C

Pan evaporation: 0.85-3.2 mm/d; Rainfall: 2-17.5 mm/wk

Soil: Coarse loamy

Test crop: Rajmash (*Phaseolus vulgaris* L.)

Variety :Contender

Experimentation:

Replication: Three;

Statistical Design: Split-plot

Treatment: **Main plot:**

CPE₃₃ - Crop was irrigated when Cumulative Pan Evaporation (CPE) value was 33 mm.

CPE₄₄ – Crop was irrigated when CPE value was 44 mm.

CPE₆₆ – Crop was irrigated when CPE value was 66 mm.

Sub-plot :

P₀ – 0 kg P₂O₅ applied per hectare,

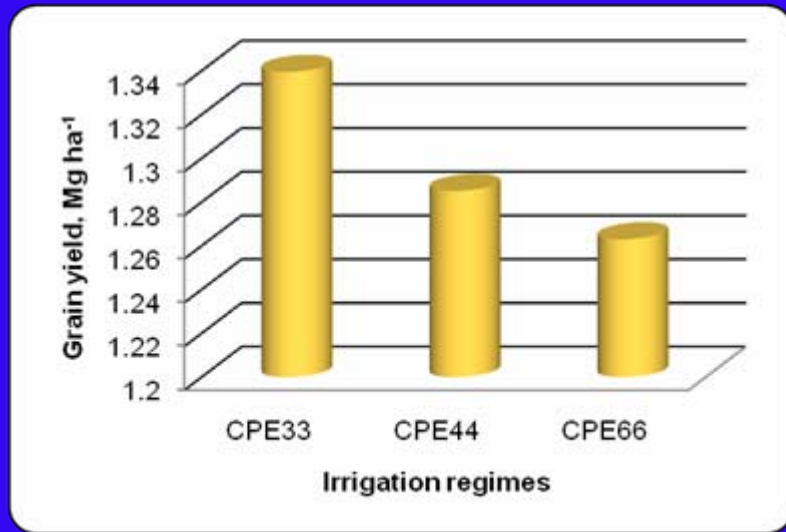
P₃₀ – 30 kg P₂O₅ applied per hectare,

P₆₀ – 60 kg P₂O₅ applied per hectare,

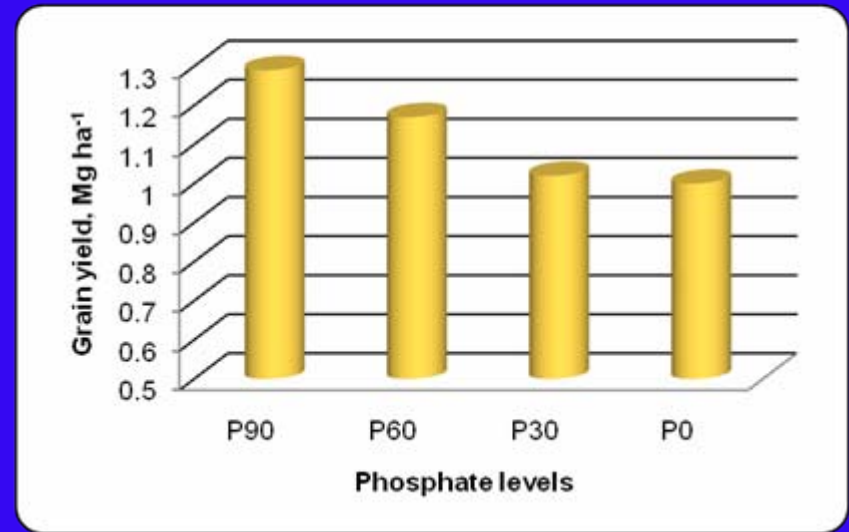
P₉₀ – 90 kg P₂O₅ applied per hectare

Depth of irrigation- **30** mm

Findings:



(a)



(b)

Fig.1: Role of irrigation frequencies (a) and phosphate levels (b) on **grain yield**

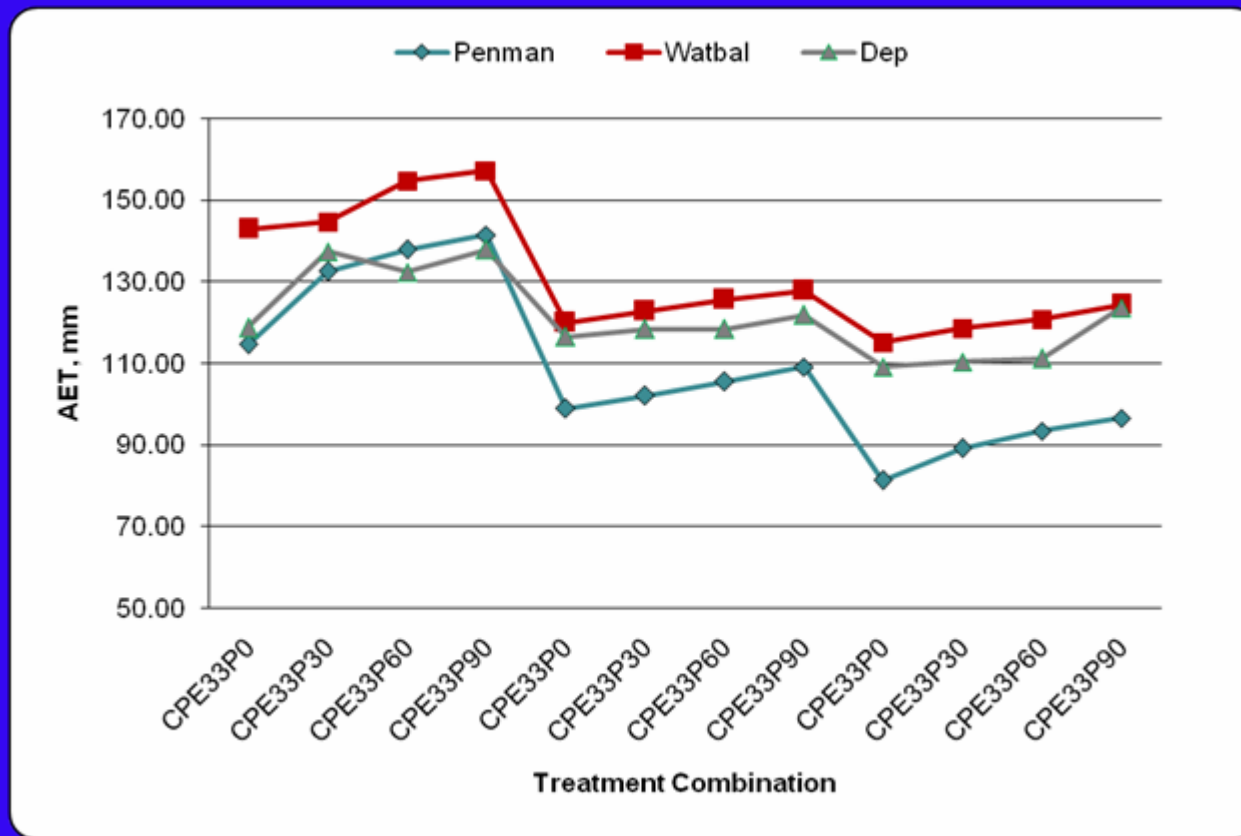
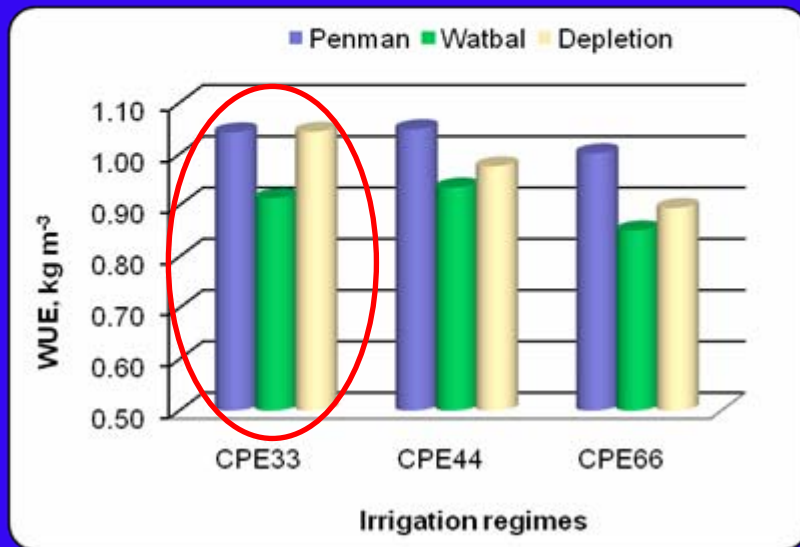
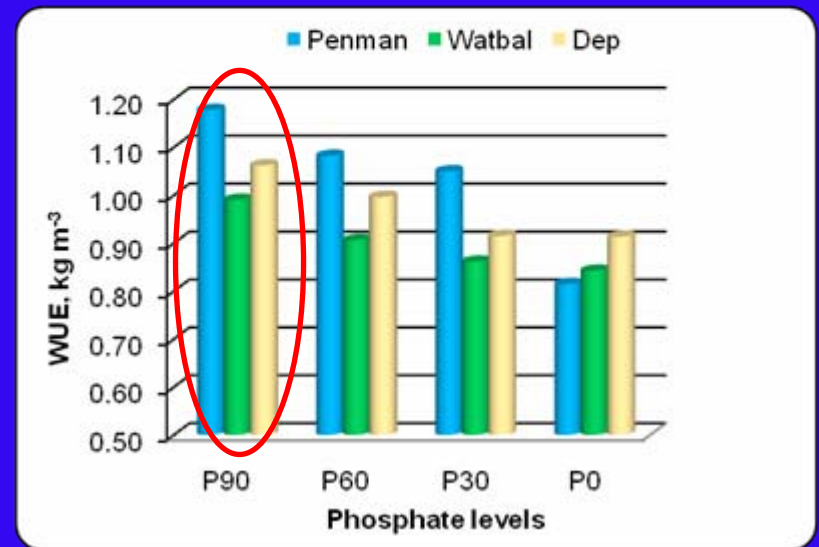


Fig.2: Comparison of estimated AET computed by different methods



(a)



(b)

Fig.3: Impact of irrigation regimes (a) and phosphate levels (b) on water use efficiency (WUE) computed by different methods

Conclusion:

1. Maximum grain yield obtained under CPE_{33} (1.37 Mg ha^{-1}) and P_{90} (1.29 Mg ha^{-1}) treatments.
2. AET varied in the range of 7.3-14.3 and 11.2-17.2% respectively, under different irrigation frequencies and phosphate levels.
3. It is shown that irrespective of treatments WUE attained highest value ($0.63\text{-}1.23 \text{ kg m}^{-3}$) under FAO- Penman-Monteith model and reduced by 3-21 and 6-10% respectively, under water balance and depletion method.
4. For proper utilization of irrigation water, FAO- Penman-Monteith method is the best one to estimate AET in the Lower Gangetic Plain for rajmash crop.

THANK YOU