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Measurement of Evapotranspiration Formulas

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List of 18 Measurement of Evapotranspiration Formulas

Measurement of Evapotranspiration

Evapotranspiration Equations

1) Adjustment related to Latitude of Place given Potential Evapotranspiration

Open Calculator

fx $$L_a = \frac{E_T}{1.6 \cdot \left(\frac{10 \cdot T_a}{I_t}\right)^{a} \_ \{Th\}}$$

ex $$1.034824 = \frac{26.85\text{cm}}{1.6 \cdot \left(\frac{10 \cdot 20}{10}\right)^{0.93}}$$

2) Equation for Blaney Criddle

Open Calculator

fx $$E_T = 2.54 \cdot K \cdot F$$

ex $$26.84526\text{cm} = 2.54 \cdot 0.65 \cdot 16.26$$

3) Equation for Net Radiation of Evaporable Water

Open Calculator

fx $$H_n = H_a \cdot (1 - r) \cdot \left(a + \left(b \cdot \frac{n}{N}\right)\right) - \sigma \cdot T_a^4 \cdot \left(0.56 - 0.092 \cdot \sqrt{e_a}\right) \cdot \left(0.1 + \left(0.9 \cdot \frac{n}{N}\right)\right)$$

ex $$6.976407 = 13.43 \cdot (1 - 0.25) \cdot \left(0.2559 + \left(0.52 \cdot \frac{9}{10.716}\right)\right) - 0.00000000201 \cdot (20)^4 \cdot \left(0.56 - 0.092 \cdot \sqrt{3\text{m}}\right.$$

4) Mean Monthly Air Temperature for Potential Evapotranspiration in Thornthwaite Equation

Open Calculator

fx $$T_a = \left(\frac{E_T}{1.6 \cdot L_a}\right)^{\frac{1}{a_{Th}}} \cdot \left(\frac{I_t}{10}\right)$$

ex $$19.89299 = \left(\frac{26.85\text{cm}}{1.6 \cdot 1.04}\right)^{\frac{1}{0.93}} \cdot \left(\frac{10}{10}\right)$$

5) Net Radiation of Evaporable water given Daily Potential Evapotranspiration

Open Calculator

$$H_n = \frac{PET \cdot (A + \gamma) - (E_a \cdot \gamma)}{A}$$

$$1.990933 = \frac{2.06 \cdot (1.05 + 0.49) - (2.208 \cdot 0.49)}{1.05}$$

6) Parameter Including Wind Velocity and Saturation Deficit

Open Calculator

$$E_a = \frac{PET \cdot (A + \gamma) - (A \cdot H_n)}{\gamma}$$

$$2.21 = \frac{2.06 \cdot (1.05 + 0.49) - (1.05 \cdot 1.99)}{0.49}$$

7) Penman's Equation

Open Calculator

$$PET = \frac{A \cdot H_n + E_a \cdot \gamma}{A + \gamma}$$

$$2.059364 = \frac{1.05 \cdot 1.99 + 2.208 \cdot 0.49}{1.05 + 0.49}$$

8) Thornthwaite Formula

Open Calculator

$$E_T = 1.6 \cdot L_a \cdot \left(\frac{10 \cdot T_a}{I_t}\right)^{a} \_ \{Th\}$$

$$26.9843\text{cm} = 1.6 \cdot 1.04 \cdot \left(\frac{10 \cdot 20}{10}\right)^{0.93}$$

Potential Evapotranspiration of Crops

9) Potential Evapotranspiration of Cotton

Open Calculator

$$ET = 0.90 \cdot ET_o$$

$$0.54\text{mm/h} = 0.90 \cdot 0.6\text{mm/h}$$

10) Potential Evapotranspiration of Dense Natural Vegetation

Open Calculator

$$ET = 1.2 \cdot ET_o$$

$$0.72\text{mm/h} = 1.2 \cdot 0.6\text{mm/h}$$

11) Potential Evapotranspiration of Light Natural Vegetation

Open Calculator

fx $ET = 0.8 \cdot ET_o$

ex $0.48mm/h = 0.8 \cdot 0.6mm/h$

12) Potential Evapotranspiration of Maize

Open Calculator

fx $ET = 0.80 \cdot ET_o$

ex $0.48mm/h = 0.80 \cdot 0.6mm/h$

13) Potential Evapotranspiration of Medium Natural Vegetation

Open Calculator

fx $ET = 1 \cdot ET_o$

ex $0.6mm/h = 1 \cdot 0.6mm/h$

14) Potential Evapotranspiration of Potatoes

Open Calculator

fx $ET = 0.7 \cdot ET_o$

ex $0.42mm/h = 0.7 \cdot 0.6mm/h$

15) Potential Evapotranspiration of Rice

Open Calculator

fx $ET = 1.1 \cdot ET_o$

ex $0.66mm/h = 1.1 \cdot 0.6mm/h$

16) Potential Evapotranspiration of Sugarcane

Open Calculator

fx $ET = 0.9 \cdot ET_o$

ex $0.54mm/h = 0.9 \cdot 0.6mm/h$

17) Potential Evapotranspiration of Very Dense Vegetation

Open Calculator

fx $ET = 1.3 \cdot ET_o$

ex $0.78mm/h = 1.3 \cdot 0.6mm/h$

18) Potential Evapotranspiration of Wheat

Open Calculator

fx $ET = 0.65 \cdot ET_o$

ex $0.39mm/h = 0.65 \cdot 0.6mm/h$

Variables Used

- **a** Constant depending on Latitude
- **A** Slope of Saturation Vapour Pressure
- a_{Th} An Empirical Constant
- **b** A constant
- e_a Actual Vapour Pressure *(Millimeter Mercury (0 °C))*
- E_a Parameter of Wind Velocity and Saturation Deficit
- E_T Potential Evapotranspiration in Crop Season *(Centimeter)*
- **ET** Potential Evapotranspiration of Crop *(Millimeter per Hour)*
- ET_o Reference Crop Evapotranspiration *(Millimeter per Hour)*
- **F** Sum of Monthly Consumptive Use factors
- H_a Incident Solar Radiation Outside the Atmosphere
- H_n Net Radiation of Evaporable Water
- I_t Total Heat Index
- **K** An Empirical Coefficient
- L_a Adjustment Factor
- **n** Actual Duration of Bright Sunshine
- **N** Maximum Possible Hours of Bright Sunshine
- **PET** Daily Potential Evapotranspiration
- **r** Reflection Coefficient
- T_a Mean Air Temperature
- **γ** Psychrometric Constant
- **σ** Stefan-Boltzmann constant

Constants, Functions, Measurements used

- Function: **sqrt**, sqrt(Number)
  Square root function
- Measurement: **Length** in Centimeter (cm)
  Length Unit Conversion
- Measurement: **Pressure** in Millimeter Mercury (0 °C) (mmHg)
  Pressure Unit Conversion
- Measurement: **Speed** in Millimeter per Hour (mm/h)
  Speed Unit Conversion

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