Important Measurement of Evapotranspiration Formulas PDF

Formulas
Examples
with Units

List of 18
Important Measurement of Evapotranspiration Formulas

1) Evapotranspiration Equations Formulas

1.1) Adjustment related to Latitude of Place given Potential Evapotranspiration Formula

Evaluate Formula

Formula

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

Example with Units

$$1.0348 = \frac{26.85\,\text{cm}}{1.6 \cdot \left(\frac{10 \cdot 20}{10}\right)^{0.93}}$$

1.2) Equation for Blaney Criddle Formula

Evaluate Formula

Formula

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

Example with Units

$$26.8453\,\text{cm} = 2.54 \cdot 0.65 \cdot 16.26$$

1.3) Equation for Net Radiation of Evaporable Water Formula

Evaluate Formula

Formula

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

Example with Units

$$6.9764 = 13.43 \cdot (1 - 0.25) \cdot \left(0.2559 + \left(0.52 \cdot \frac{9}{10.716}\right)\right) - 0.00000000201 \cdot 20^4 \cdot \left(0.56 - 0.092 \cdot \sqrt{3\,\text{mmHg}}\right) \cdot \left(0.1 + \left(0.9 \cdot \frac{9}{10.716}\right)\right)$$

1.4) Mean Monthly Air Temperature for Potential Evapotranspiration in Thornthwaite Equation Formula

Evaluate Formula

Formula

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

Example with Units

$$19.893 = \left(\frac{26.85\,\text{cm}}{1.6 \cdot 1.04}\right)^{\frac{1}{0.93}} \cdot \left(\frac{10}{10}\right)$$

1.5) Net Radiation of Evaporable water given Daily Potential Evapotranspiration Formula

Evaluate Formula

Formula

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

Example

$$1.9909 = \frac{2.06 \cdot (1.05 + 0.49) - (2.208 \cdot 0.49)}{1.05}$$

1.6) Parameter Including Wind Velocity and Saturation Deficit Formula

Evaluate Formula

Formula

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

Example

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

1.7) Penman's Equation Formula

Evaluate Formula

Formula

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

Example

$$2.0594 = \frac{1.05 \cdot 1.99 + 2.208 \cdot 0.49}{1.05 + 0.49}$$

1.8) Thornthwaite Formula Formula

Evaluate Formula

Formula

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

Example with Units

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

2) Potential Evapotranspiration of Crops Formulas

2.1) Potential Evapotranspiration of Cotton Formula

Evaluate Formula

Formula

$$ET = 0.90 \cdot ET_o$$

Example with Units

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

2.2) Potential Evapotranspiration of Dense Natural Vegetation Formula

Evaluate Formula

Formula

$$ET = 1.2 \cdot ET_o$$

Example with Units

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

2.3) Potential Evapotranspiration of Light Natural Vegetation Formula

Evaluate Formula

Formula

$$ET = 0.8 \cdot ET_o$$

Example with Units

$$0.48\,\text{mm/h} = 0.8 \cdot 0.6\,\text{mm/h}$$

2.4) Potential Evapotranspiration of Maize Formula

Evaluate Formula

Formula

$$ET = 0.80 \cdot ET_o$$

Example with Units

$$0.48\,\text{mm/h} = 0.80 \cdot 0.6\,\text{mm/h}$$

2.5) Potential Evapotranspiration of Medium Natural Vegetation Formula

Evaluate Formula

Formula

$$ET = 1 \cdot ET_o$$

Example with Units

$$0.6\,\text{mm/h} = 1 \cdot 0.6\,\text{mm/h}$$

2.6) Potential Evapotranspiration of Potatoes Formula

Evaluate Formula

Formula

$$ET = 0.7 \cdot ET_o$$

Example with Units

$$0.42\,\text{mm/h} = 0.7 \cdot 0.6\,\text{mm/h}$$

2.7) Potential Evapotranspiration of Rice Formula

Evaluate Formula

Formula

$$ET = 1.1 \cdot ET_o$$

Example with Units

$$0.66\,\text{mm/h} = 1.1 \cdot 0.6\,\text{mm/h}$$

2.8) Potential Evapotranspiration of Sugarcane Formula

Evaluate Formula

Formula

$$ET = 0.9 \cdot ET_o$$

Example with Units

$$0.54\,\text{mm/h} = 0.9 \cdot 0.6\,\text{mm/h}$$

2.9) Potential Evapotranspiration of Very Dense Vegetation Formula

Evaluate Formula

Formula

$$ET = 1.3 \cdot ET_o$$

Example with Units

$$0.78\,\text{mm/h} = 1.3 \cdot 0.6\,\text{mm/h}$$

2.10) Potential Evapotranspiration of Wheat Formula

Evaluate Formula

Formula

$$ET = 0.65 \cdot ET_o$$

Example with Units

$$0.39\,\text{mm/h} = 0.65 \cdot 0.6\,\text{mm/h}$$

Variables used in list of Measurement of Evapotranspiration Formulas above

- **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 in list of Measurement of Evapotranspiration Formulas above

- Functions: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- 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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