

Blaney-Criddle Formula

The formula was developed to estimate consumptive use of irrigated crops in the United States. It is based on similar assumptions as the evaporation model of Thorntwaite. The Blaney-Criddle formula uses temperature and day-length as independent variables. The formula reads:

$$E_t = (0.14 \cdot T_a + 1.095) \cdot (T_a + 17.8) \cdot k \cdot d$$

with

E_t = potential evapotranspiration in cm/month

T_a = average air temperature in °Celsius. When T_a is less than 3 °C, the first term in parenthesis is set to 1.38.

k = an empirical factor depending on crop type and stage of growth (needs tables).

d = the monthly fraction of annual hours of daylight (table).

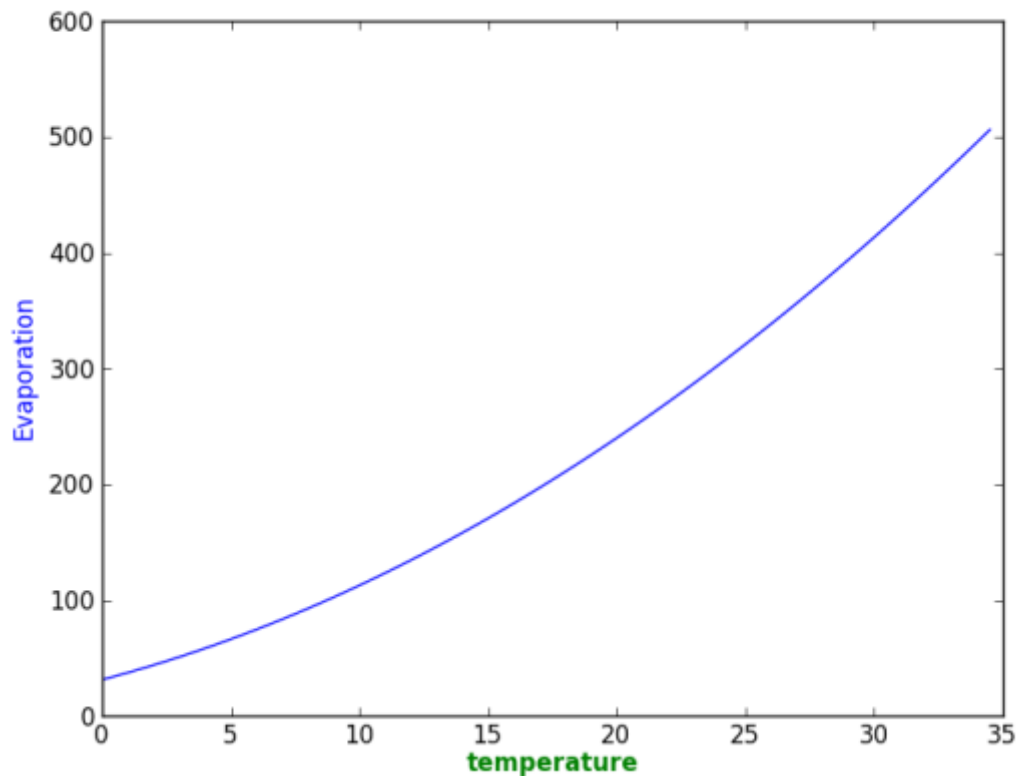
This formula does not contain moisture and transport terms. These are included in the crop factor that should be checked for any regional application outside of U.S. and original region.

The code for this formula is:

[|Blaney-Criddle.py](#)

```
from pylab import *
def f(t):
    d = 0.85
    k = 1.9
    et = (0.142*t+1.095)*(t+17.8)*k*d
    return et
t = arange(0.0, 35.0, 0.5)
plot(t, f(t))
ytext = ylabel('Evaporation')
xtext = xlabel('temperature')
setp(xtext, size='medium', name='courier', weight='bold', color='g')
setp(ytext, size='medium', name='helvetica', weight='light', color='b')
show()
```

Evaporation depends on temperature (a proxy for available energy). Just download the python-code, run it with a python compiler.



There is a formula for the whole growing season:

$$E_t \text{ [cm]} = K \sum_{i=1}^n (1.8 \cdot T_{ai} + 32) \cdot d_i$$

where

K = crop coefficient for the whole season n = number of months in growing season i = individual month in the growing season so that T_{ai} and d_i are the air temperature in ° Celsius and the fraction of annual hours of daylight for each month.

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