

DailyET

[A simple 'calculator' for estimating daily reference crop evapotranspiration (ET_o)]

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Name

DailyET

Keywords

Reference crop evapotranspiration, daily ET, monthly ET, calculator

Category

Irrigation management

Description

Abstract

DailyET is a simple Windows based calculator for estimating daily and monthly reference evapotranspiration (ET_o) according to four methods using data collected from either conventional or electronic weather stations. The minimum input data required are maximum and minimum air temperature, relative humidity, sunshine duration, wind speed and the location of the weather station (latitude, height above sea level). The outputs are daily or monthly reference evapotranspiration in mm.

Background and usage

The correct estimate of the reference evapotranspiration (ET_o) is crucial for any professional working in the area of crop production regardless whether under dryland or irrigated conditions. The knowledge about the reference evapotranspiration (ET_o) provides the basis for the computation of the crop water requirement (ET_{crop}) as function of reference evapotranspiration (ET_o) multiplied by the specific crop coefficient (K_c) in the form of $ET_{crop} = ET_o \times K_c$. It allows to predict e.g. when water stress could occur and may assists in optimising the irrigation scheduling process. The full background and procedures on evapotranspiration and how to compute crop water requirements is given by Allen et al (1998).

Figure 1
 A screenshot of DailyET showing daily ET_o data.
 (Click to enlarge)

Several major software packages exist which provide advanced and extended functionality in computing reference evapotranspiration as well as crop water requirements based on climatic, crop and soil data. However in many cases a simple and quick estimate may be sufficient to either crosscheck existing and published data or to get an estimate of the current situation without going through more elaborate processes required when using full-featured packages in this field. DailyET is such a program and was written by Hess (1996a) at Cranfield University in the UK. It is a Windows based small software tool which provides a quick and

simple daily and monthly reference evapotranspiration with only a minimum of data required for inputs. While it does not use any crop related data it is still a practical tool which can be used alongside other packages on an occasional or day to day basis. However it is not meant to replace any full featured software which was developed to assist in the prediction of cropwater requirements or in performing advanced irrigation scheduling. A screenshot of DailyET showing daily ETo data is given in Figure 1.

Inputs

DailyET provides a simple and easy to use interface allowing the computation to be performed with a minimum of input data which are the date or month, the maximum and minimum air temperature (°C.), relative humidity (%), sunshine duration (h), wind speed or wind run (km/day) and the location of the weather station (latitude, °height above sea level, m). As an alternative the dry and wet bulb temperature (°C) taken from the psychrometer reading may be entered to compute the relative humidity or the radiation measurements (MJ/m²) may be entered instead of sunshine hours.

The evapotranspiration may be calculated using one of four methods which are Penman-Monteith, FAO Modified Penman, Penman and Penman open water. All input values are checked for plausibility and a range of possible input values are given when an input error was detected.

An additional field is provided allowing a user-defined descriptive entry such as the name of the location or weather station.

Outputs

The outputs are daily or monthly reference crop evapotranspiration calculated in mm/day or mm/month respectively.

The results are displayed on the screen only and there are no options available to save or print results. However results and settings may be captured by producing a screenshot from the DailyET window. An example of such a screenshot is shown in Figure 1. A screenshot may be produced by pressing the key combination of "ALT + Print Scrn" which produces a screenshot of the current active window and copies it into the Windows clipboard. The content of that clipboard needs to be pasted back into any graphics capable program (most word processors are by now) by pressing the key combination "Ctrl + v". It may then be printed out by using the print function of that application.

Model description

All methods and models used have been described by Allen et. al (1998), Hess and Stephens (1993) and Smith (1988). Some background is also given by Hess (1996b).

Additional on-line information, purchase, downloads

Additional on-line information

Some additional information and links to other related packages is found on the DailyET website at Cranfield University under:

<http://www.silsoe.cranfield.ac.uk/iwe/dailyet.htm>

Software download facilities

The software is being provided free of charge under the conditions specified through the Cranfield University Software Licence Agreement. Details are found in the README.txt file copied into the program directory after the installation of DailyET. There are two versions of the software. One compiled for Windows 3.1 and the other for Windows 95 and higher. Both versions may be downloaded through the link below.

http://www.silsoe.cranfield.ac.uk/iwe/_private/software/dailyet/download.htm

Software purchase

NA

Application criteria

Target group or user

This tool may be used by anybody dealing with evaporation related issues and could be used by practitioners, extension staff, students as well as scientist.

User application level and knowledge, possible adoption barriers

It is important that the basic principles of reference evapotranspiration (ET_o) as well as the meaning of the required inputs are understood so that inputs are made correctly and results are interpreted in a meaningful way. The software itself is easy to install and use. A basic input check is being provided through a pop-up help indicating the possible value range to be entered when input errors were detected. A 'sliding bar input' option provides additional input assistance. No additional descriptive and summarising help on the input values and the computational background is given so that more complex references need to be consulted in order to familiarise with the inputs and the underlying concepts. This may be a hindrance for the occasional user or for users from technically less related fields.

Program and/or application limitations

DailyET only covers reference evapotranspiration (ET_o) and does not provide options to compute crop evapotranspirations.

System requirements and specifications

Type of application:	Standalone
Software:	Windows 3.1 and Win95 or higher versions are available
Hardware:	Intel Pentium or equivalent (recommended) but would also run on 486 compatible
Unit system:	SI (metric)
Help system:	Basic input checking is done but no extended help system is provided
Version and date:	-
Working language:	English
Included with the purchase:	-
Programming language:	Visual Basic
Source code available:	No

Type of licence, usage conditions and price

Type of license:	Freeware
Price:	Free for downloads

References

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