

Crop Coefficients for Colorado: The Rocky Ford Lysimeters

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Estimation of crop evapotranspiration (ET_c)

$$ET_c = ET_{rs} \times K_{cr}$$

where

ET_{rs} = reference crop ET (tall reference like alfalfa)
= the ET rate from a **uniform surface of dense**, actively growing vegetation (**hypothetical crop**) having specified height (**50 cm or 20 inches** for alfalfa) and surface resistance (to vapor transport), **not short of soil water**, and representing an **expanse of at least 100 m (328 ft)** of the same or similar vegetation (ASCE-Standardized Reference ET equation)

K_{cr} = crop coefficient based on tall reference

$$= \frac{\overline{ET}_c}{ET_{rs}}$$

Crop lysimeter and instrumentation

Precipitation

Radiation (R_s , R_n , PAR)

Temperature (air, canopy, soil)

Wind (speed, direction)

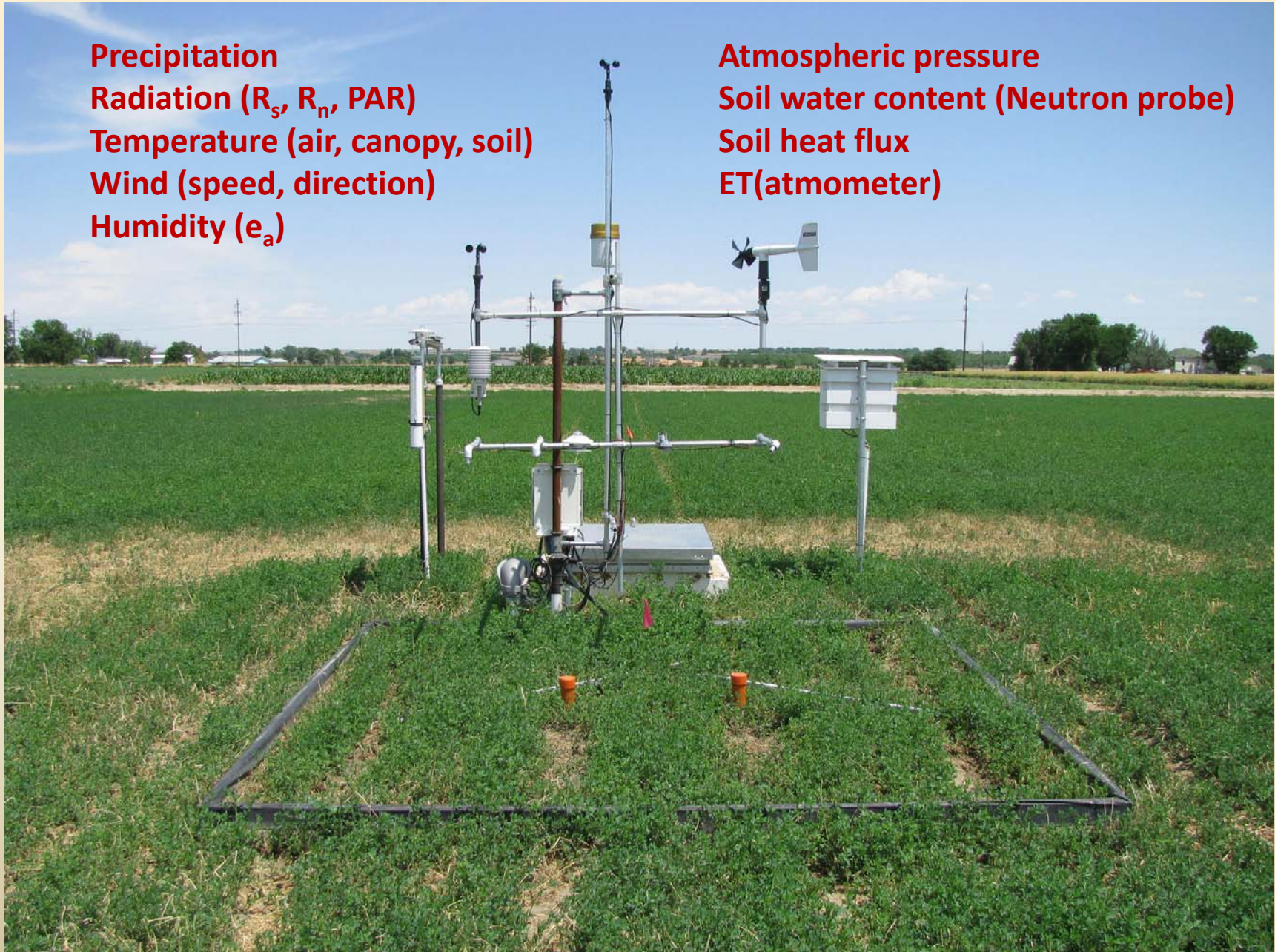
Humidity (e_a)

Atmospheric pressure

Soil water content (Neutron probe)

Soil heat flux

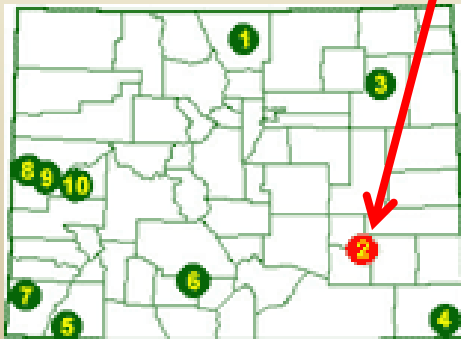
ET(atmometer)





Lysimeter project at Rocky Ford

- One reference lysimeter (1.5 m x 1.5 m x 2.4 m) to measure ET_r (completed in 2009)
- One crop lysimeter (3.0 m x 3.0 m x 2.4 m) to measure ET_c (completed in 2006)
- Network of 12 weather stations along the Arkansas Valley (part of COAgMet)
- Lysimeters located at CSU-Arkansas Valley Research Center (AVRC), Rocky Ford, Colorado



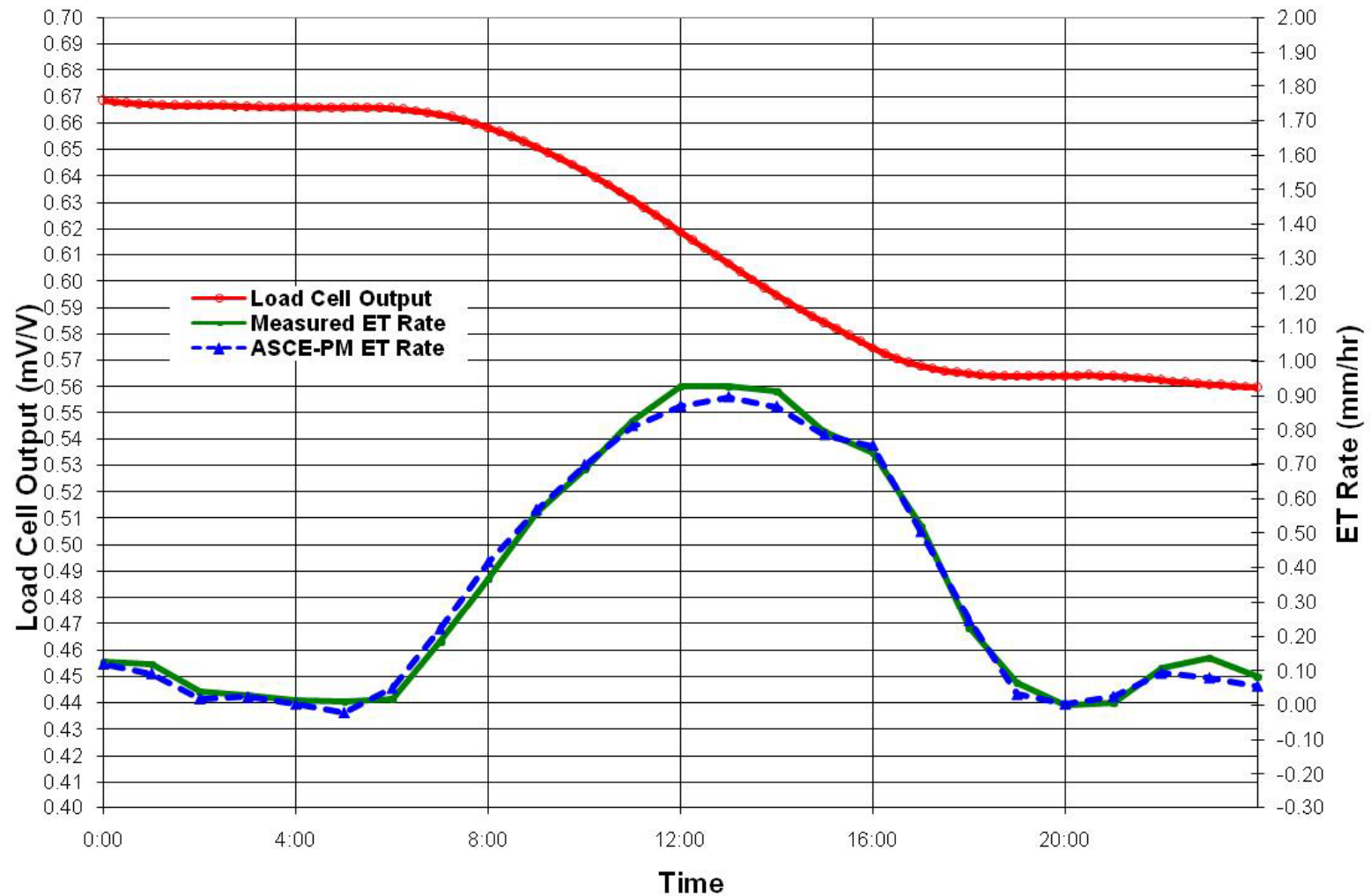
1,274 m (4179 ft) above MSL

300 mm (11.8 in) avg. annual precip.

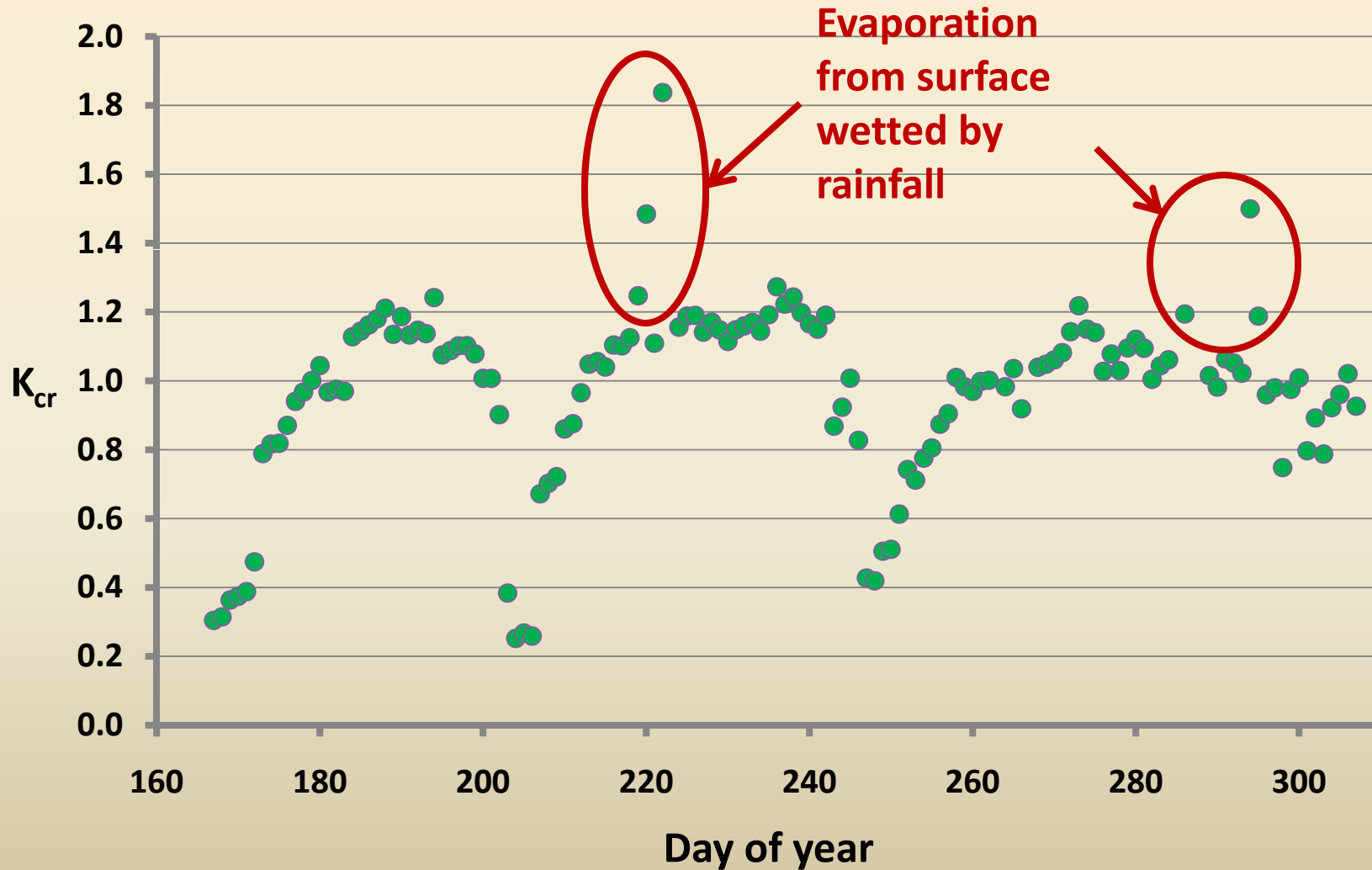
Rocky Ford clay loam soil

Example lysimeter load cell output

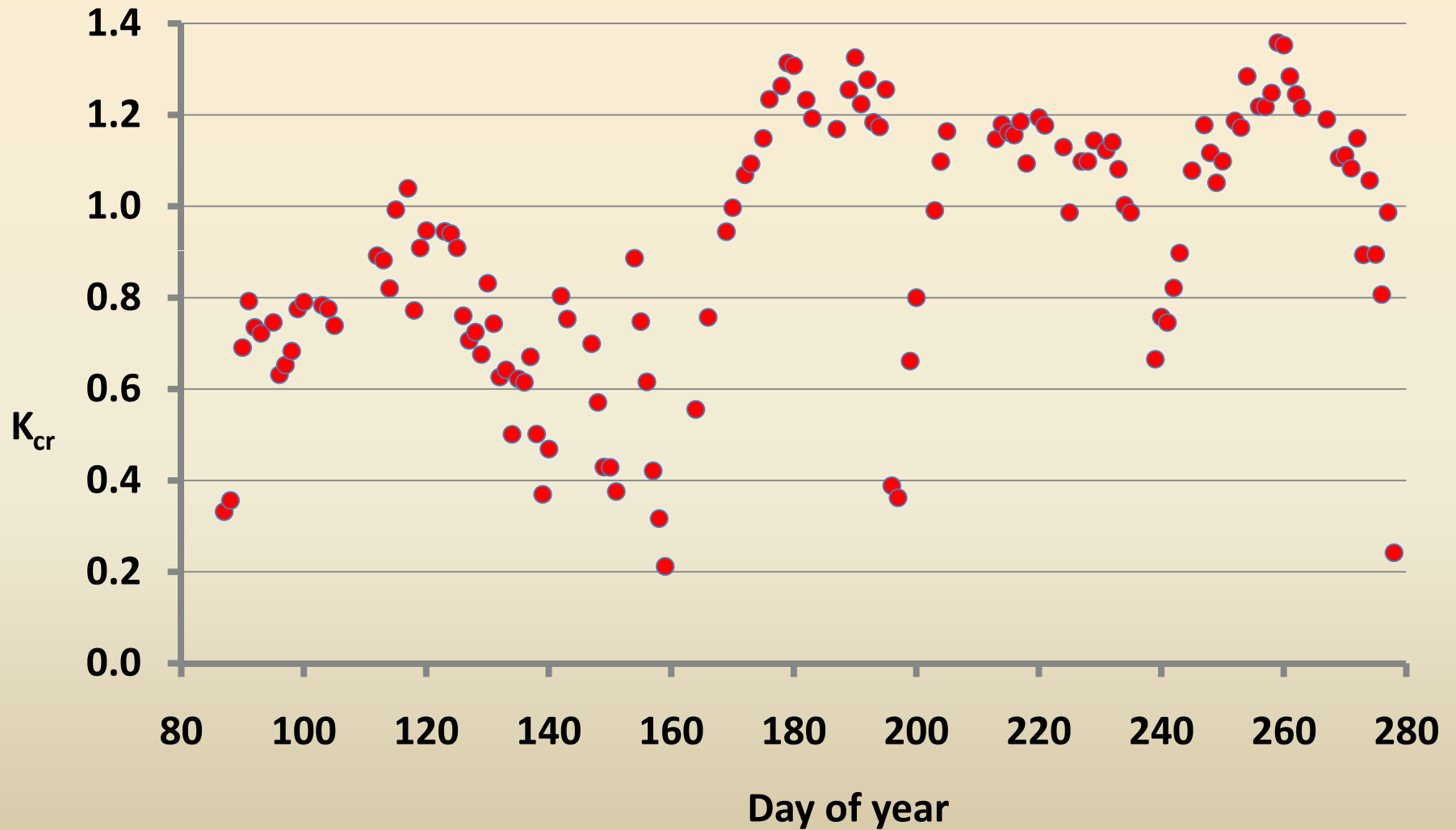
June 7, 2008



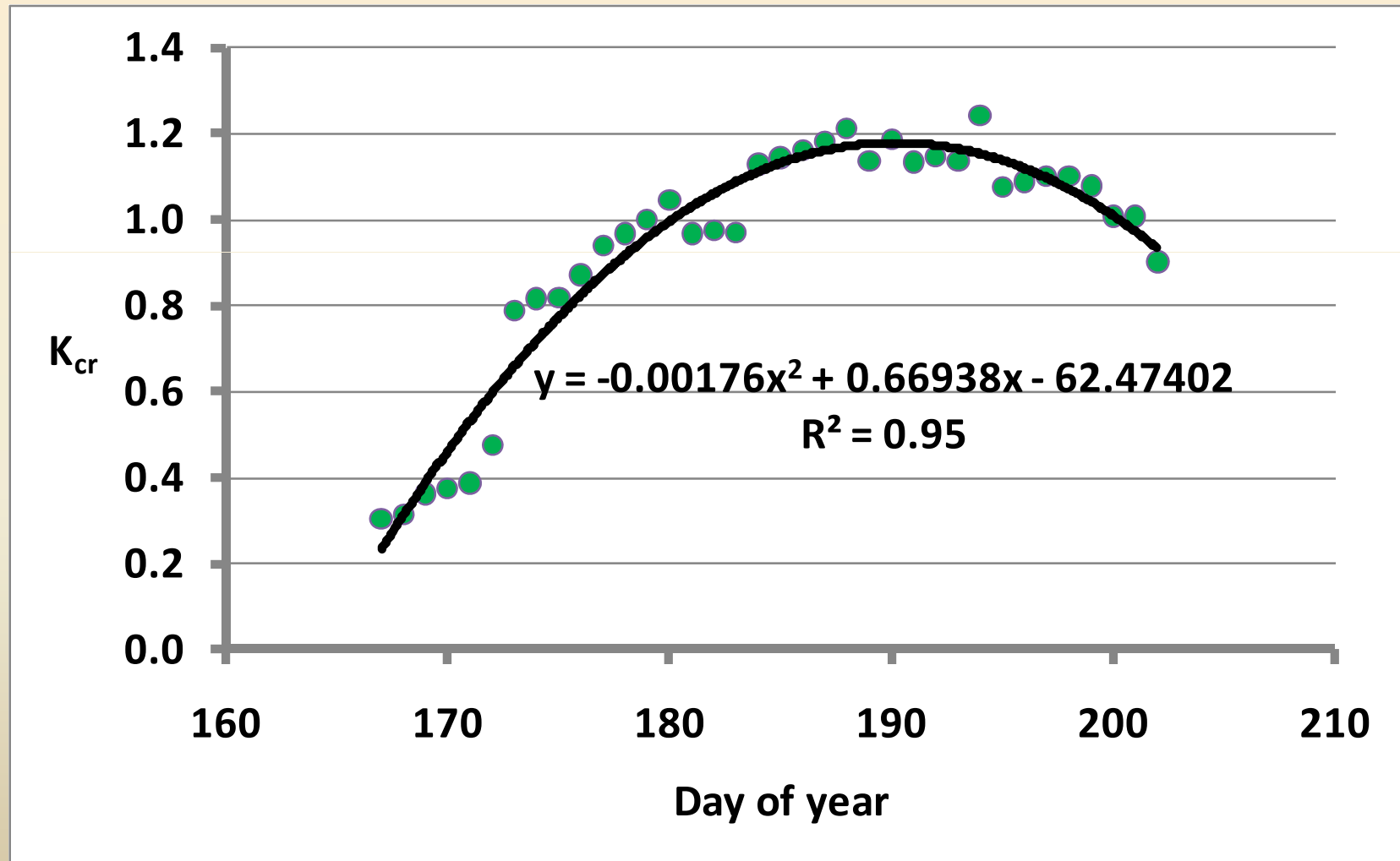
Alfalfa hay raw K_{cr} curve in 2008 (cutting cycles 2, 3, and 4)

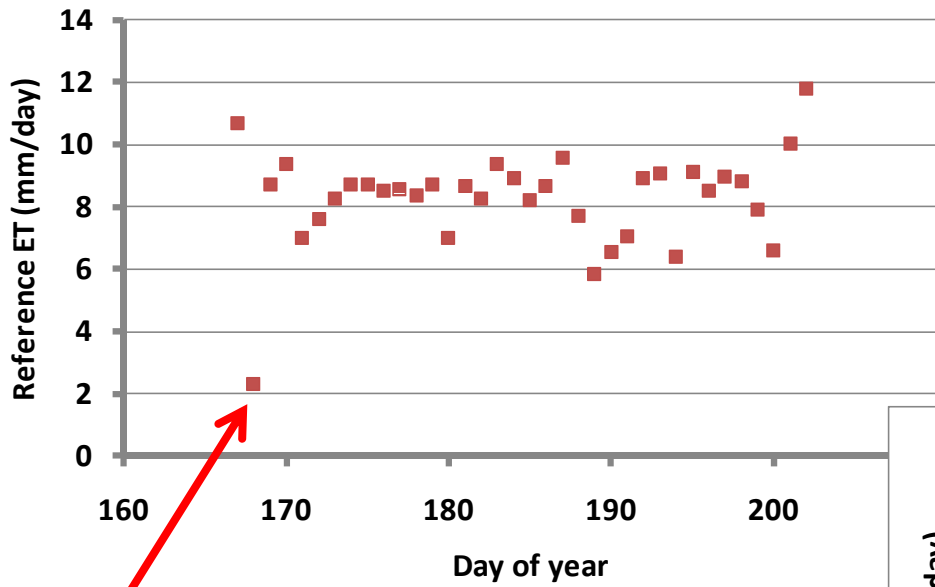


Alfalfa hay raw K_{cr} curve in 2009 (4 cutting cycles)

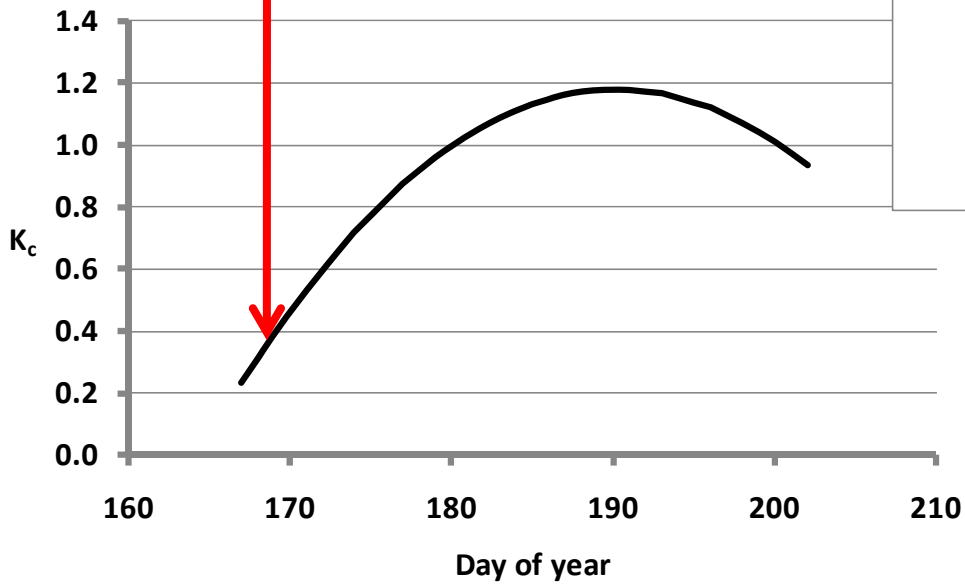
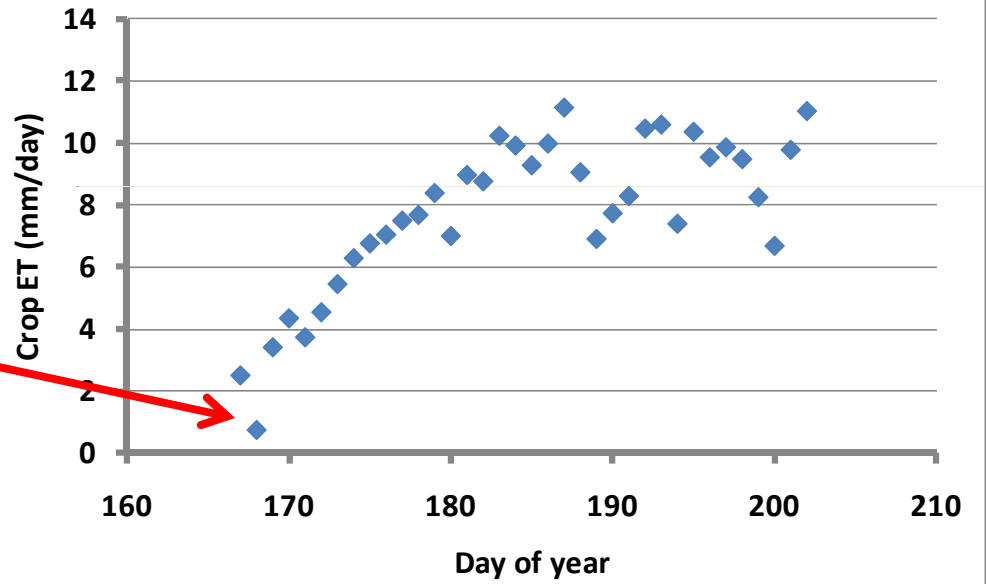


Fitted K_{cr} curve for 2nd alfalfa cutting in 2008





$$ET_{rs} \times K_{cr} = ET_c$$



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