

Use of manufacturer-specified value of greenhouse film transmissivity to estimate solar radiation and crop evapotranspiration in a hoop house

Daniel Adamson

Department of Plant Sciences, University of Wyoming

Outline

- Introduction
- Methods
- Results
- Discussion
- Conclusions



Introduction

- What is a hoop house?
- Why should I care?
 - 2 million hectares (Pardossi et al., 2004)
 - 37,500 hectares in Southern Spain (Bonachela et al., 2006)



Pardossi et al. (2004)

Hoop Houses in Wyoming

- UW Agricultural Extension
- Popularity rising
- Resource use important
 - Irrigation scheduling to conserve water and benefit crops
 - Too expensive? Too complicated?



Wyoming Hoop House Info Network

Weather-based irrigation scheduling

- Temperature
- Humidity
- Wind
- Solar Radiation 
- Estimated inside solar radiation = measured outside solar radiation x transmissivity
(Valdes-Gomez et al., 2009)

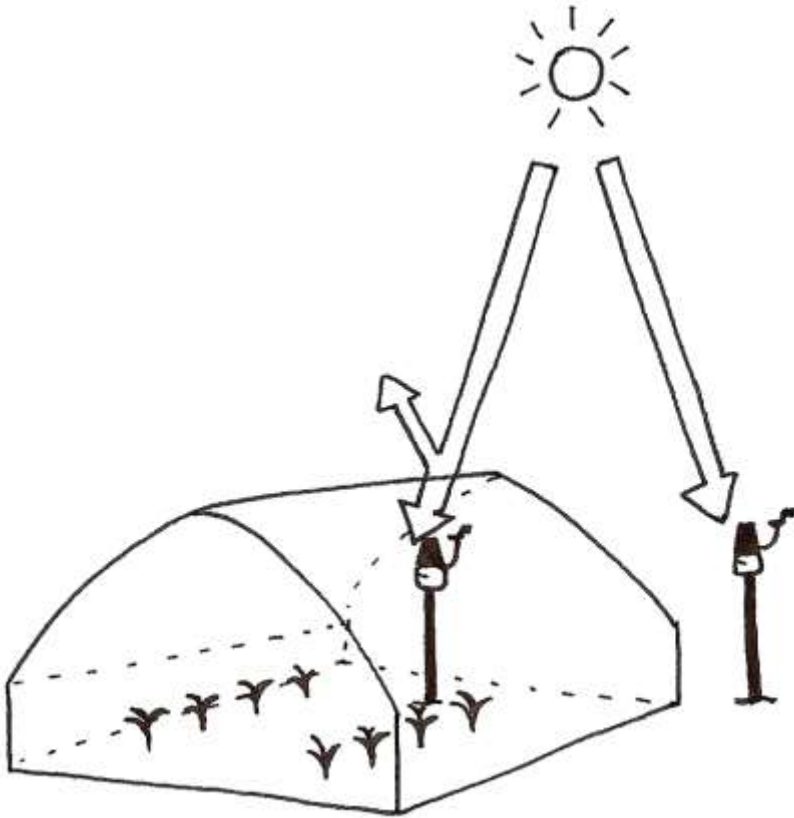
Transmissivity: the degree to which a medium allows something, particularly electromagnetic radiation, to pass through it.

(Google)

Objective

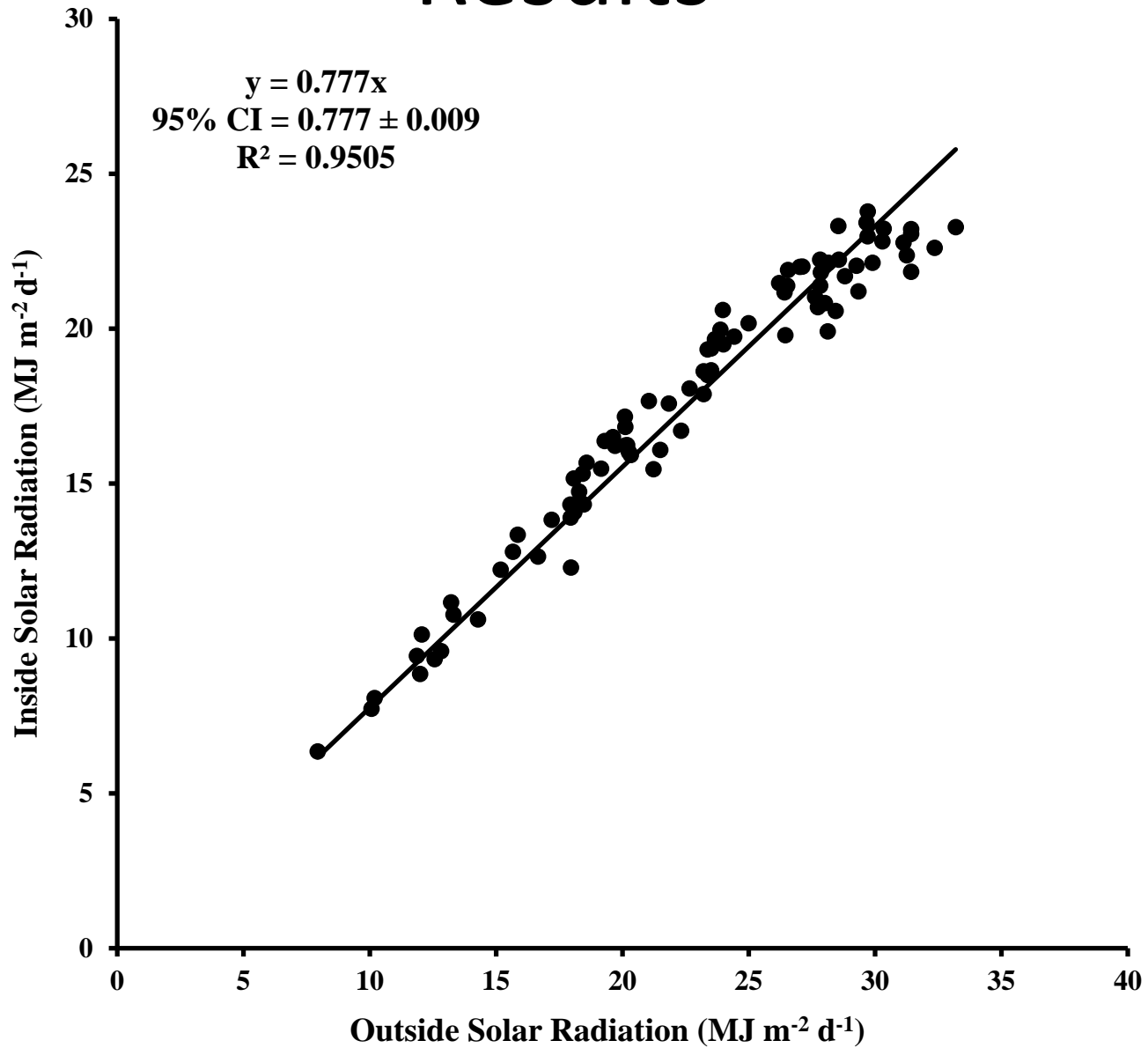
- To determine if **solar radiation** can be **estimated** inside a hoop house using the **manufacturer-specified value of film transmissivity**.
- **Facilitate** the use of weather-based models to estimate crop evapotranspiration for **accurate irrigation**.

Methods

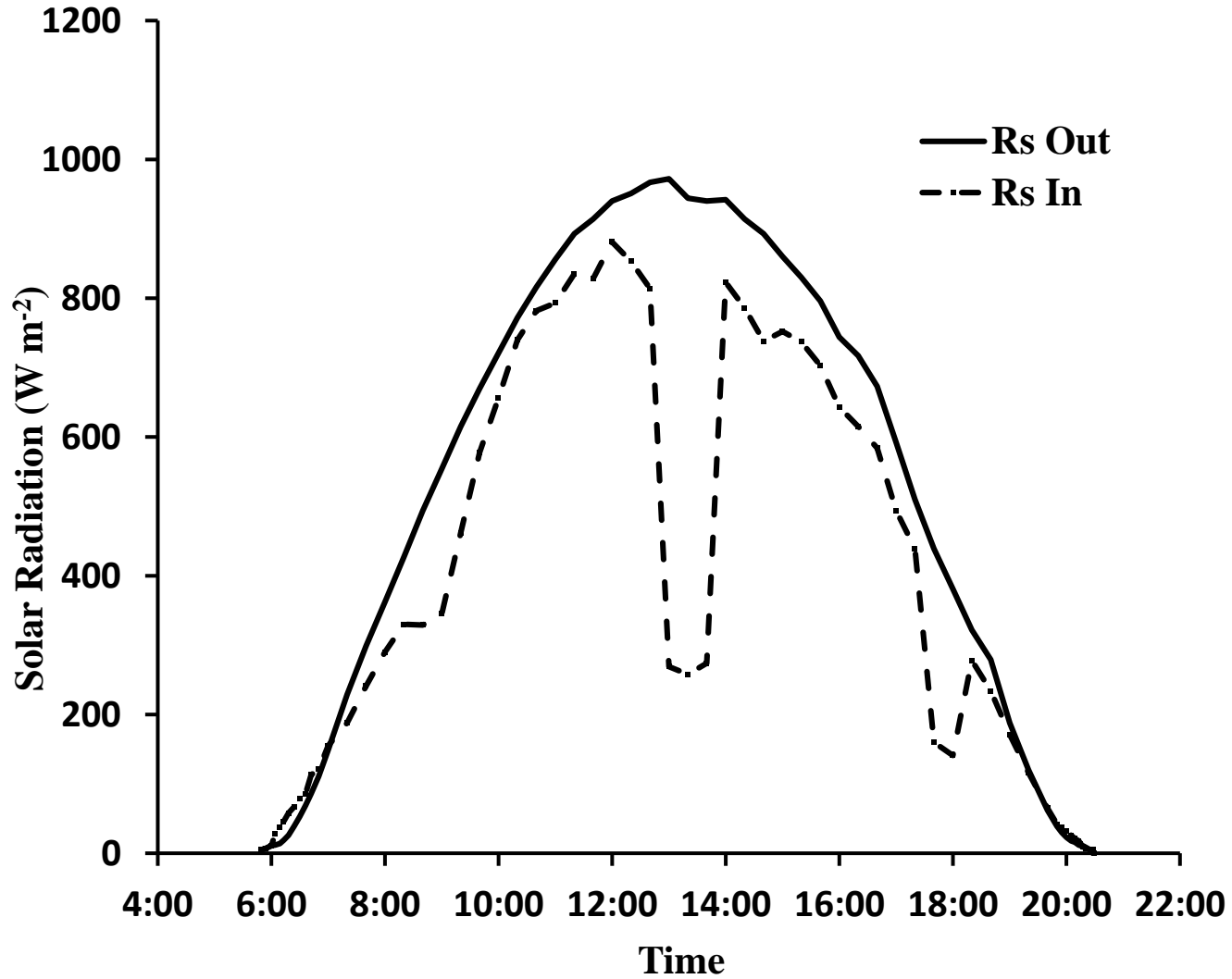


- Evapotranspiration calculated with FAO-56 PM equation (Allen et al., 1998)
- Control
 - Irrigated with measured solar radiation
- Treatment
 - Irrigated with estimated solar radiation

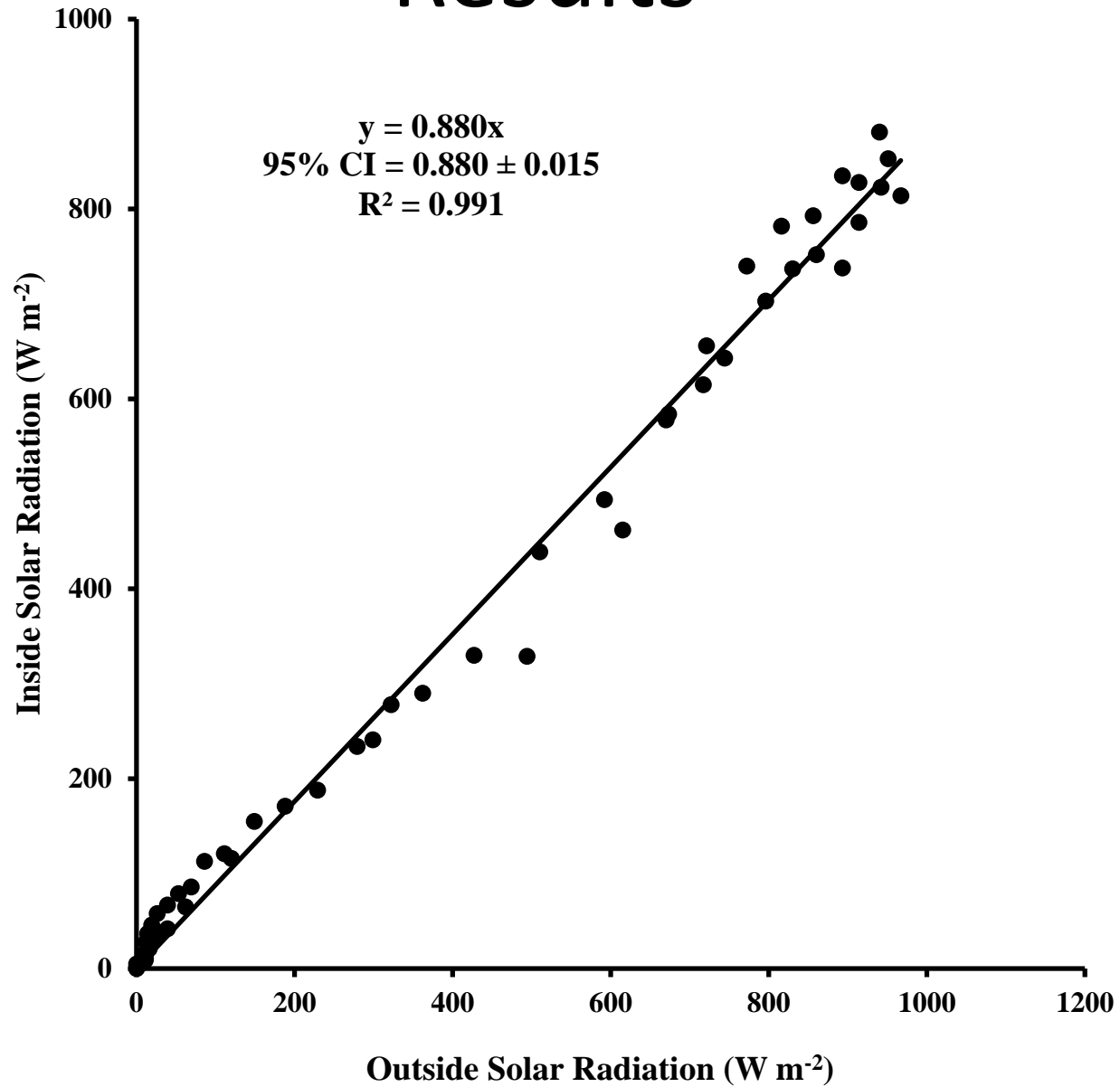
Results



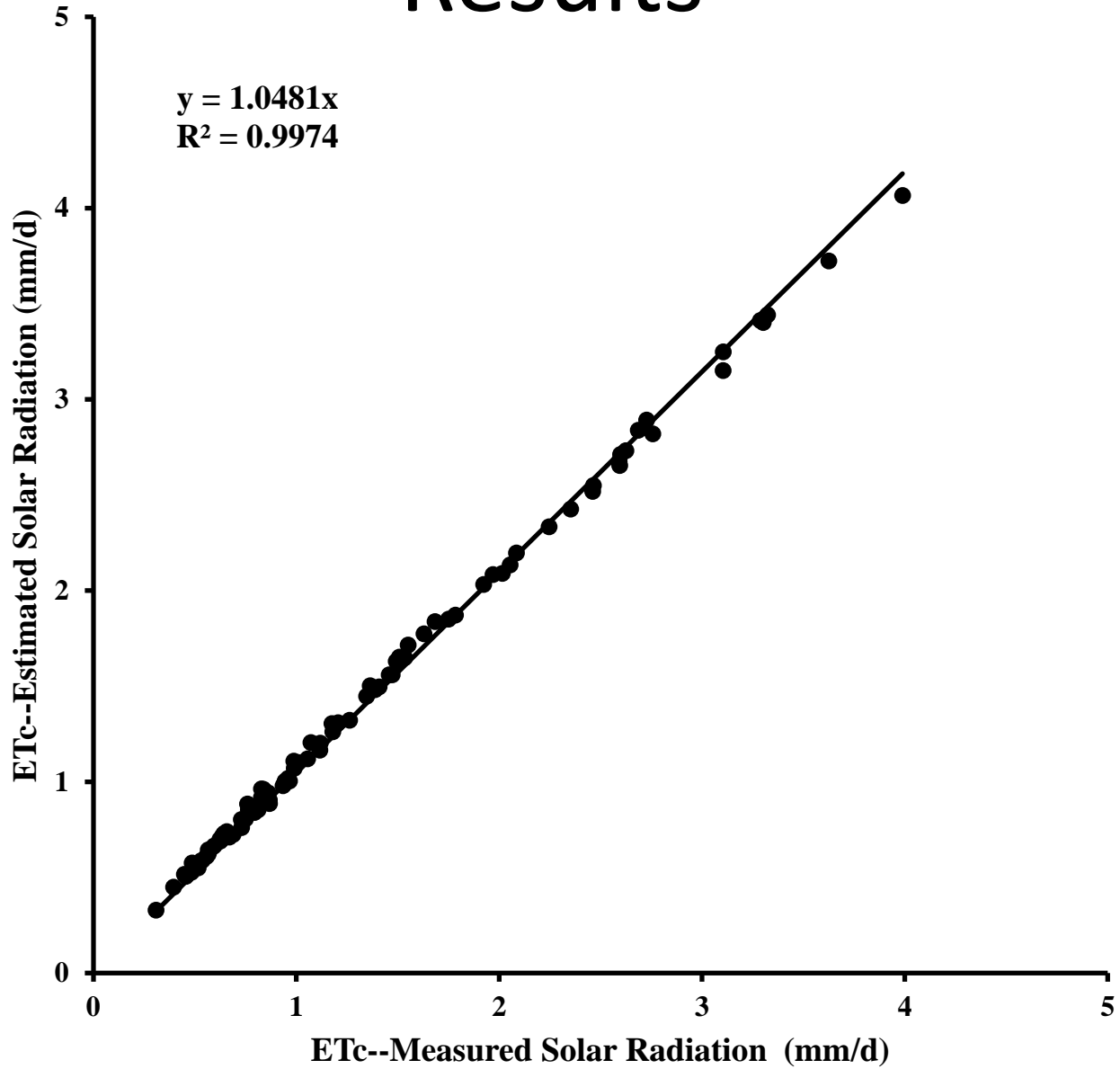
Results



Results



Results



Results

Parameter	Measured Solar Radiation	Estimated Solar Radiation
Emergence (%)	79.7 (18.8) a	76.5 (14.1) a
Height at VT (cm)	168.9 (8.1) a	174.7 (9.4) a
Yield (g)	1508 (463) a	1439 (263) a

Discussion and Conclusions

- Reduction in transmissivity is expected
 - Shading
 - Dust/Debris
 - Condensation
 - (Geoola et al., 1998; Wang & Boulard, 2000)
- Process may still be valuable because it facilitates the use of irrigation scheduling
- Adjusting manufacturer-specified transmissivity may increase accuracy.

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