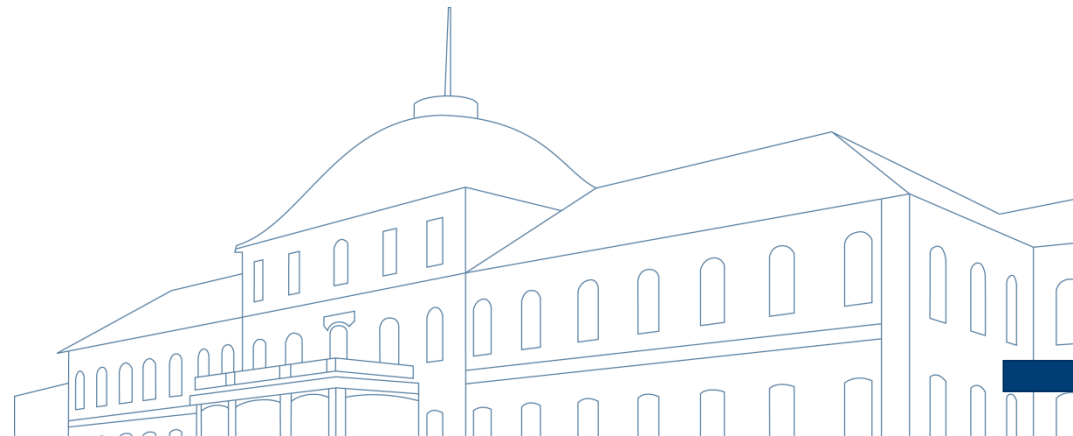


Growth and yield response of cotton to deposition of chemically inert dust in North West China

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Introduction

- Xinjiang is known as “dust center” of the Eurasian mainland
- Impact of dust deposits on plant canopy are:
 - Reduction of light absorption for photosynthesis
 - Reduction of stomatal conductance
 - Reduction of the plant biomass formation



Objectives

- Objective of this study was to examine the effects of dust deposits on cotton leaves and estimate its impact on:
 - stomatal conductance
 - canopy temperature
 - biomass formation
 - yield

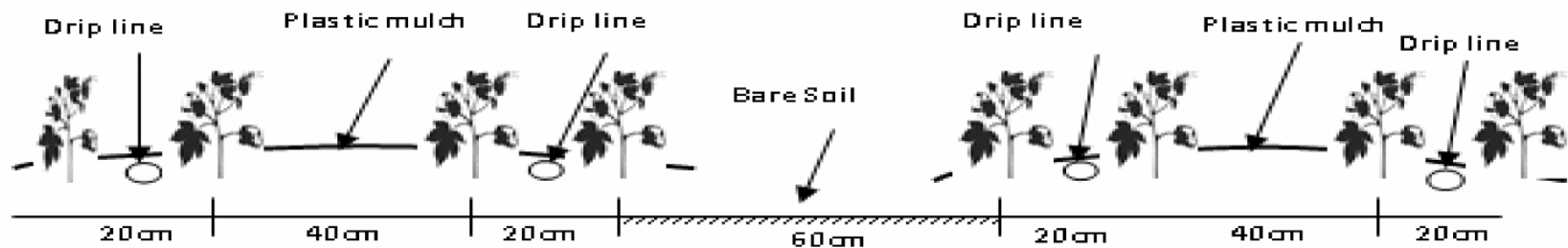
Experimental site

- Experiment was conducted at the Korla experimental station of Xinjiang Agriculture University, Kuerle City
- Annual precipitation 60 mm vs. potential evaporation of 2,450 mm
- Silt loam soil
- Field capacity (FC) at 25% SMC
- Permanent wilting point (PWP) at 9% SMC
- Drip irrigation under plastic mulch



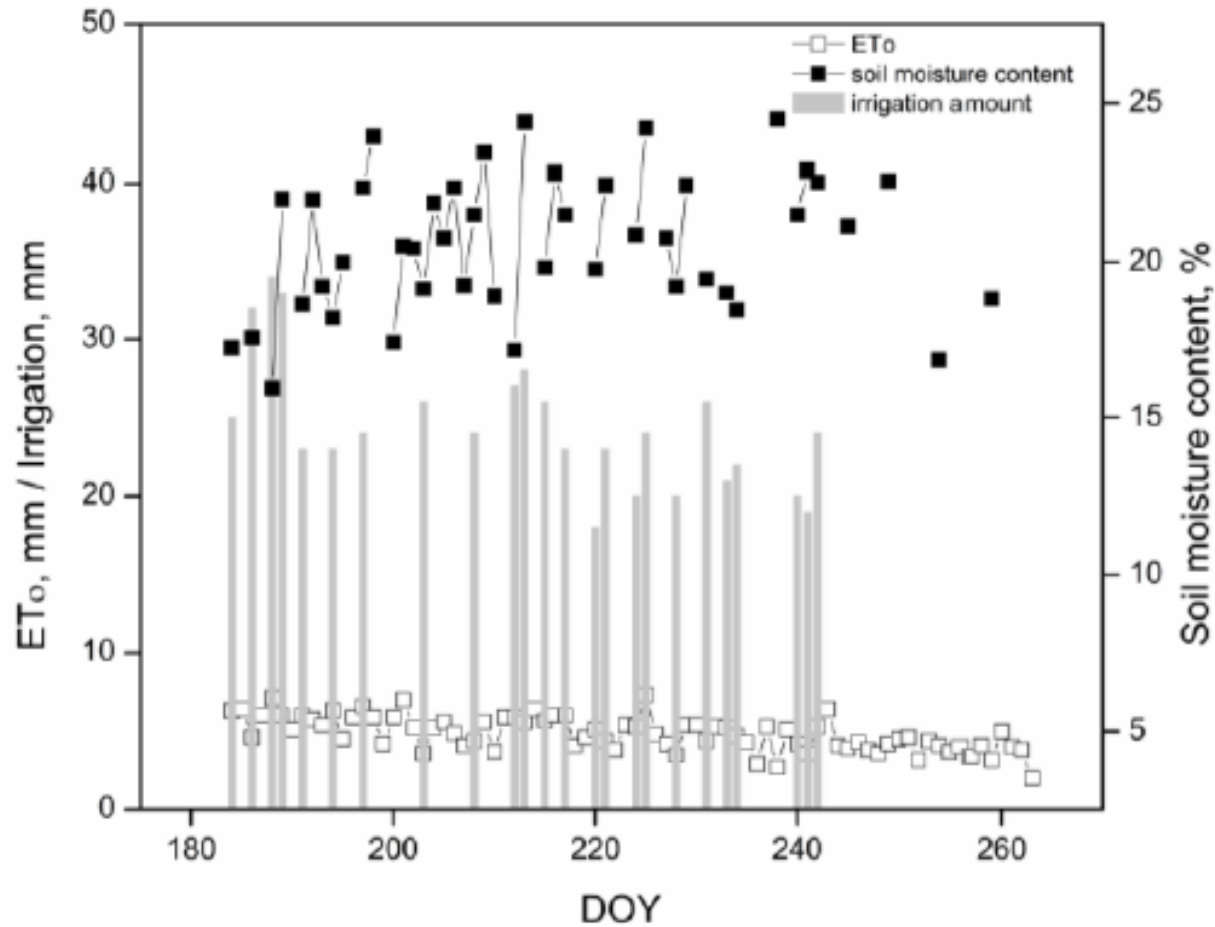
Experimental site

- Cotton (*Gossypium hirsutum* L., Xinluzhong-21)
- Sown under transparent polythene film as mulch
- Rows in N-S direction





Experimental site



ET₀=693mm
 I=631mm
 P=40mm

24 times irrigations



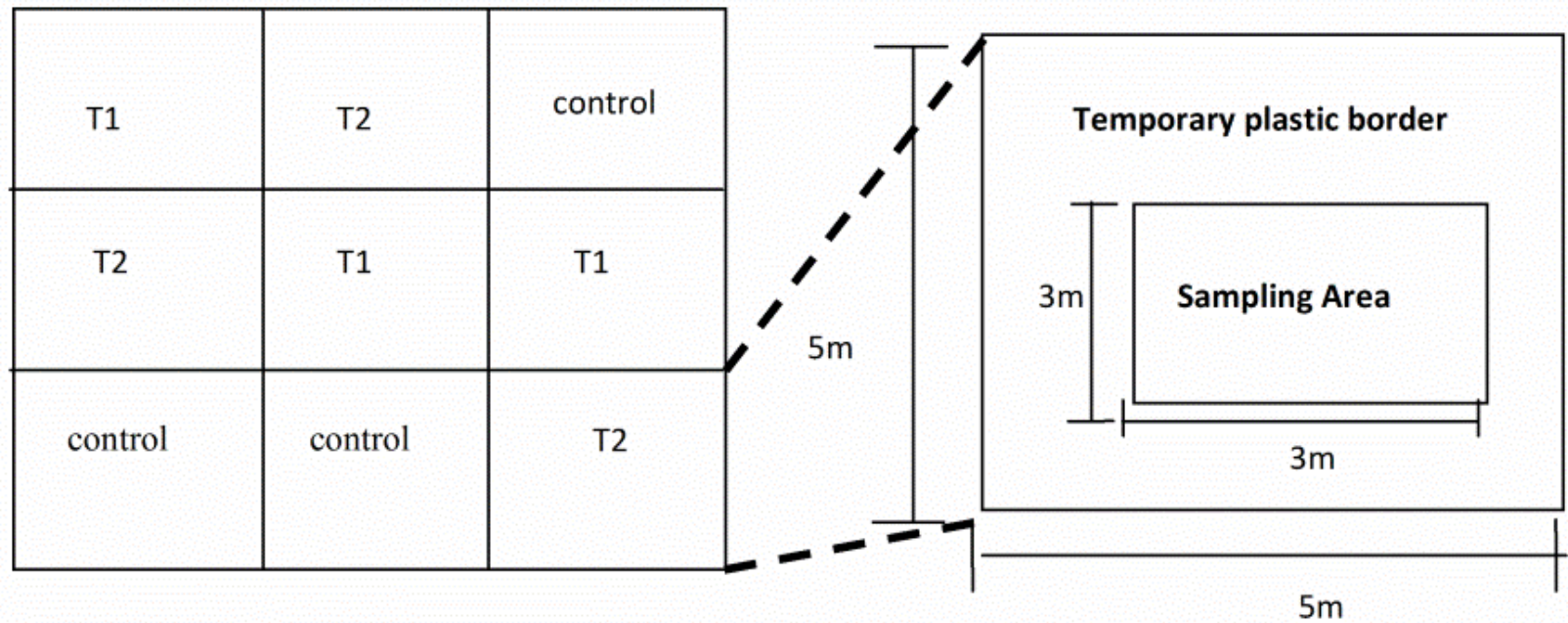
Experimental design

- Treatment 1
 - Leaves were cleaned with water
 - 3 days interval
 - or after a natural dust fall

- Treatment 2
 - Application of dust
 - 100 g/m² dust from surrounding
 - 10 days interval

- Control
 - Natural conditions

Experimental design



Experimental design

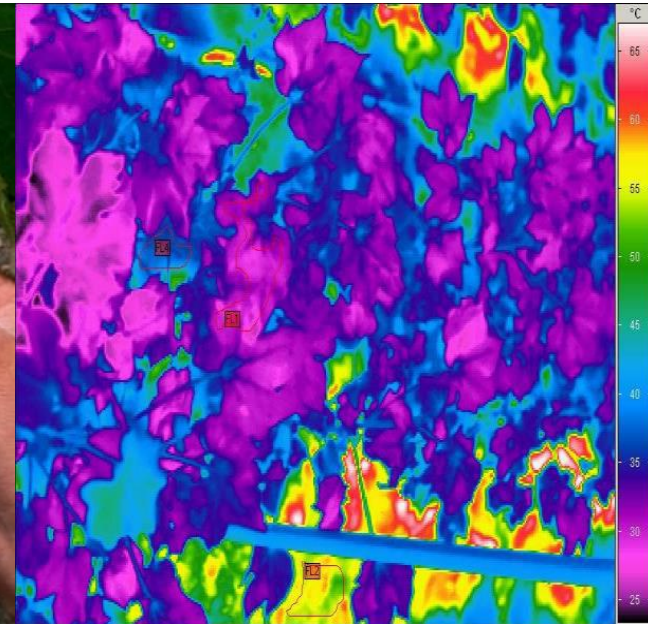
- Measurement of soil moisture content, stomatal conductance and canopy temperature



TDR profile probe



Porometer



Thermal image

Results



Control leaves

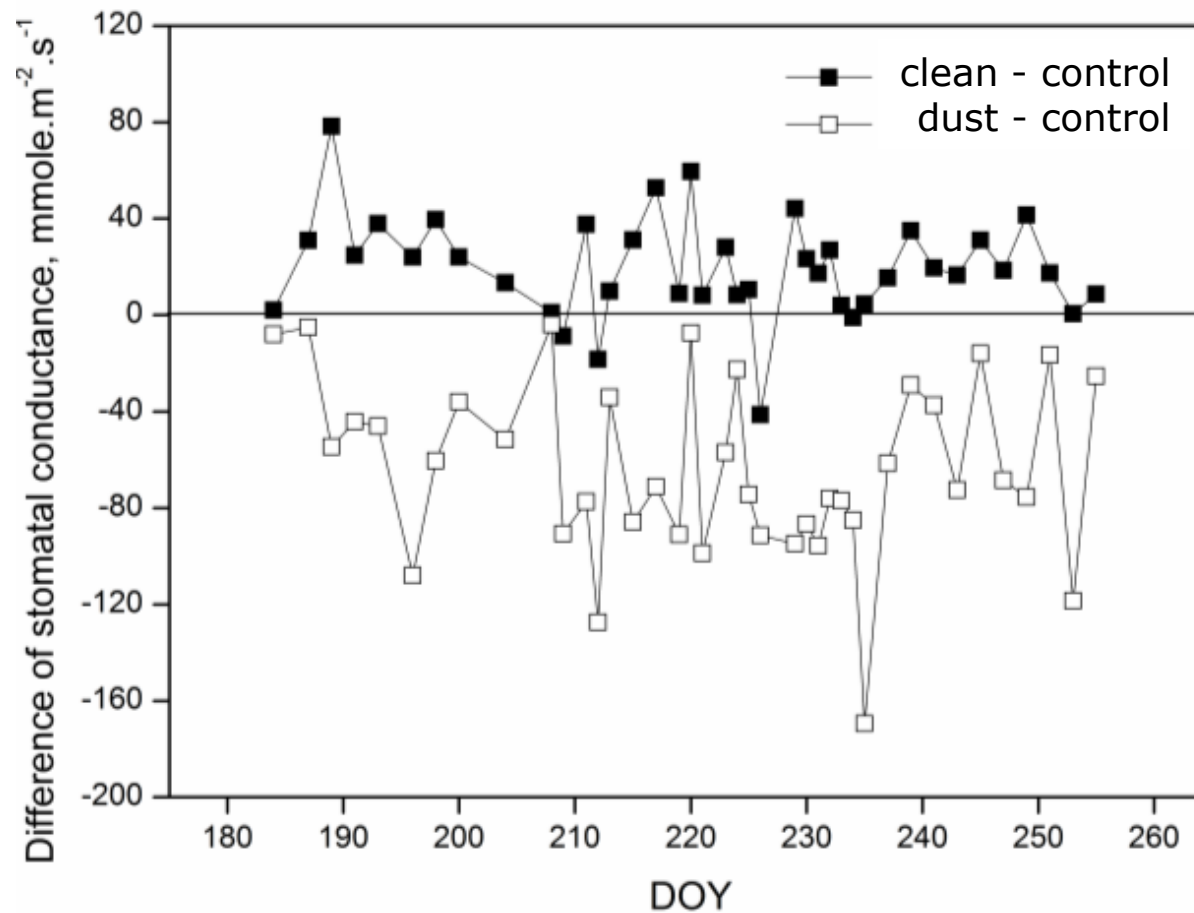


Cleaned leaves

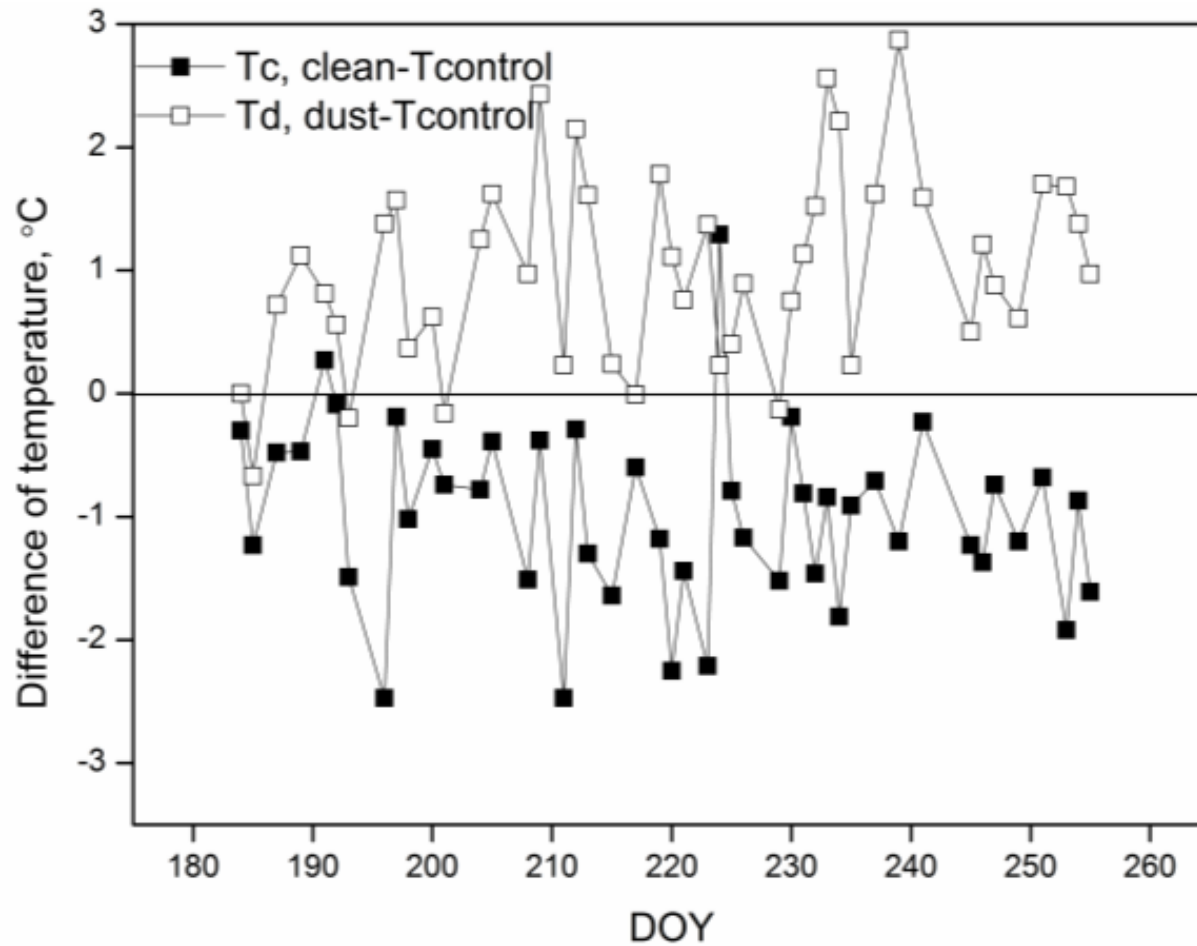


Dust applied leaves

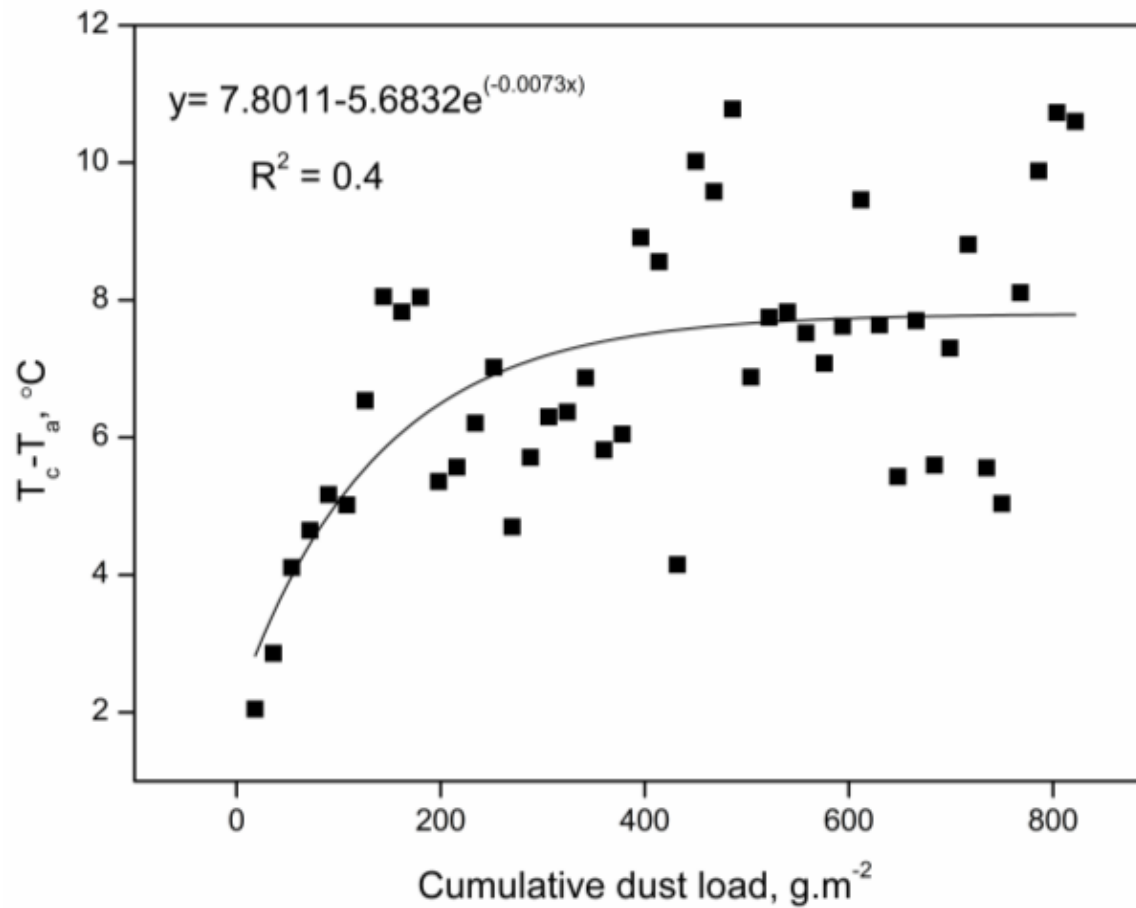
Stomatal conductance



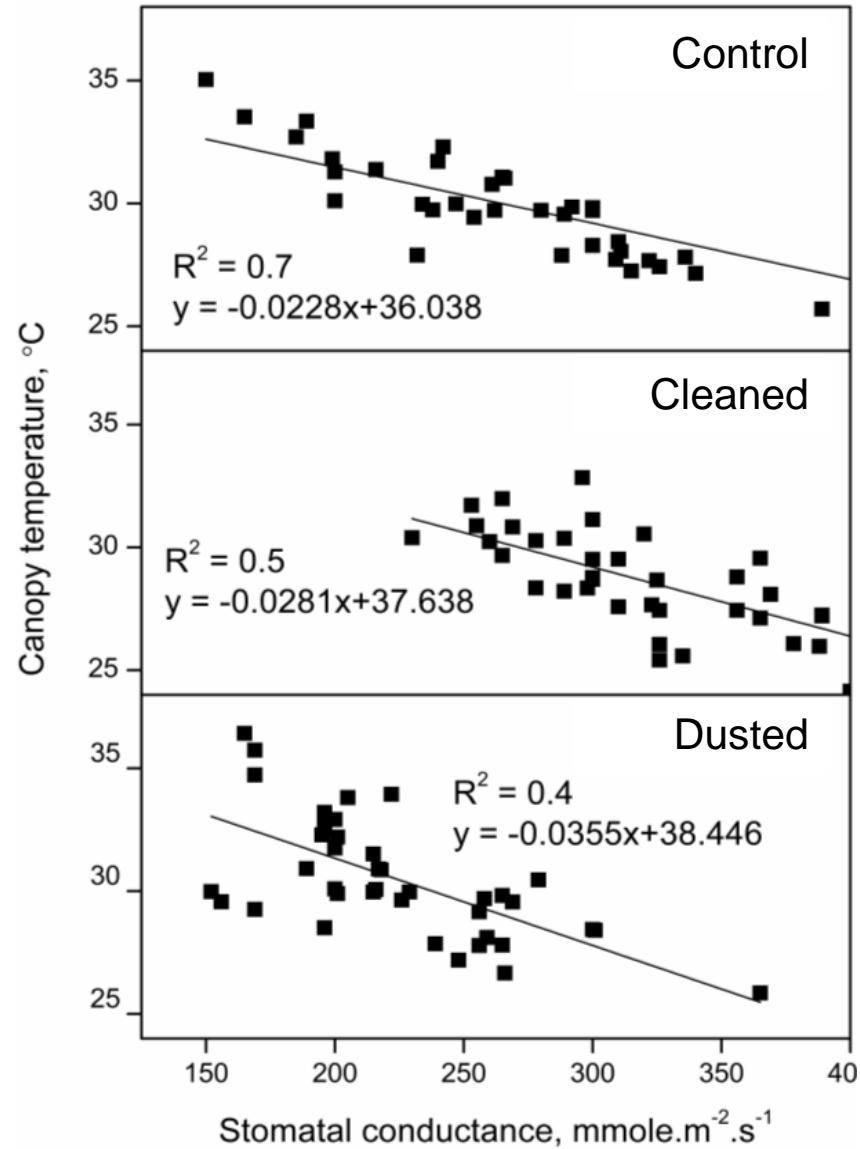
Canopy temperature



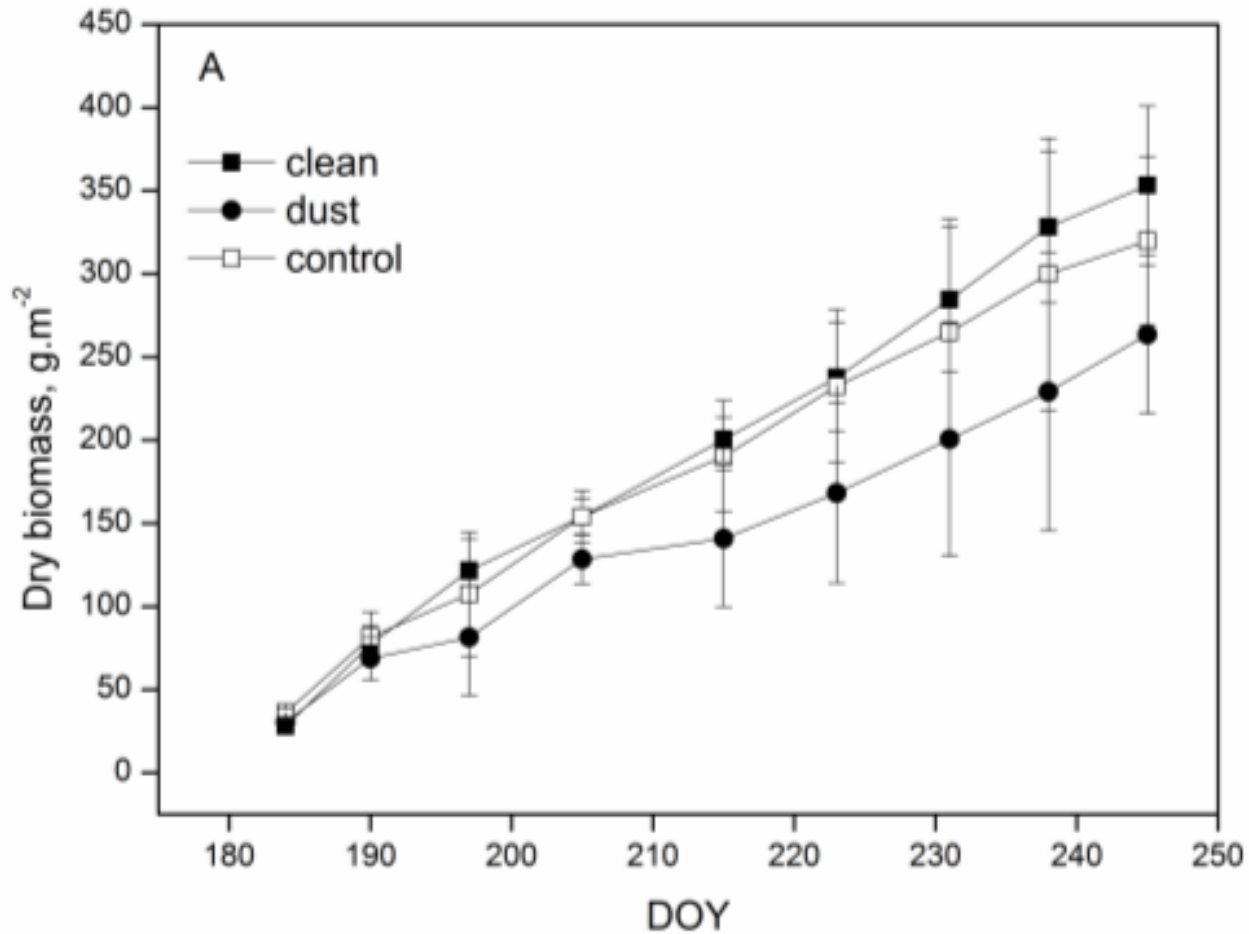
Canopy heating vs. dust load



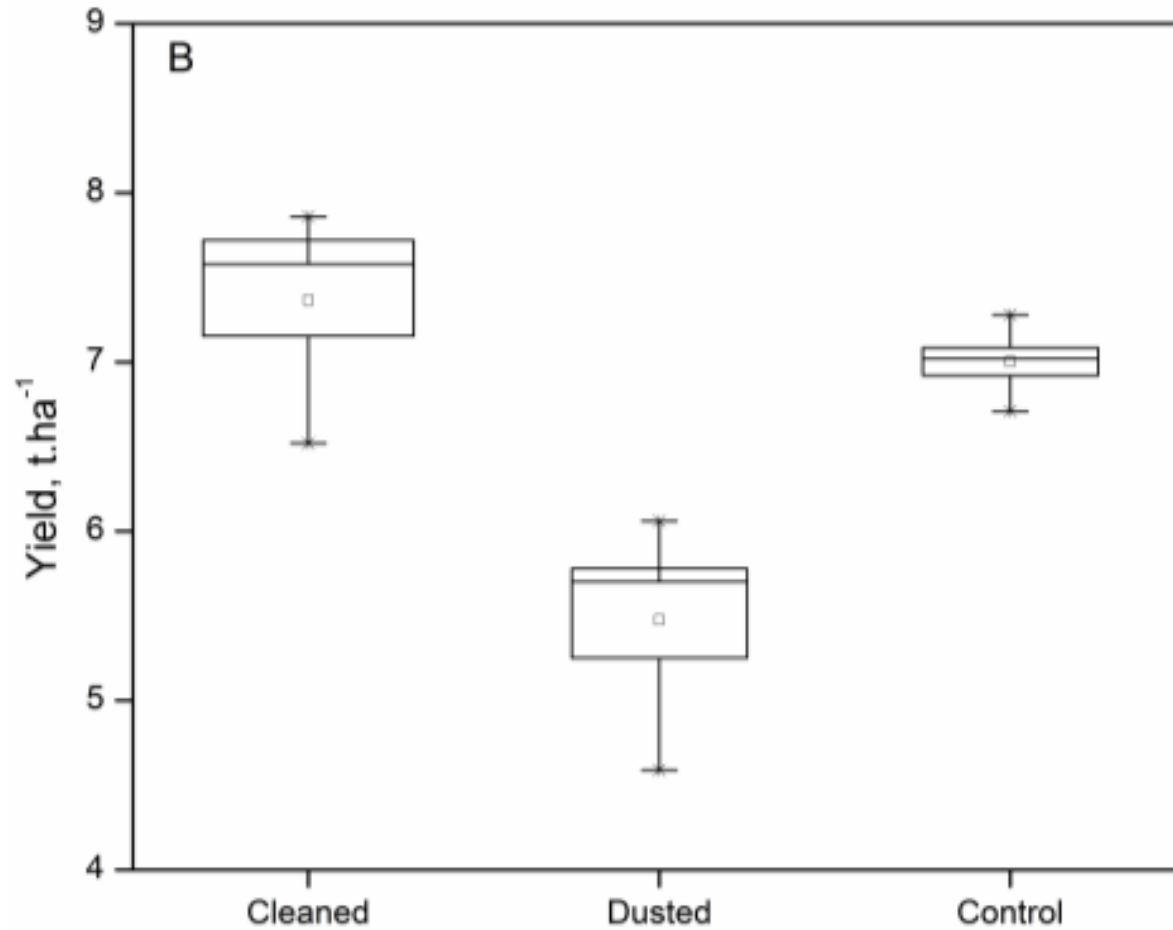
Canopy temperature vs. stomatal conductance



Biomass formation



Yield





Summary

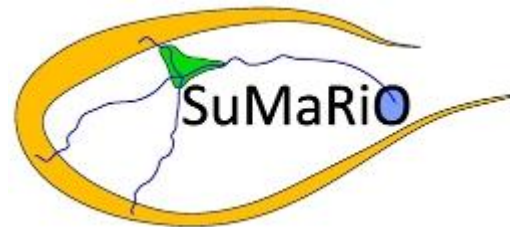
- 30% reduction in the stomatal conductance by dust treatment
- 4 °C higher temperature of dusted canopy compared to cleaned leaves
- 28% yield reduction of the dusted canopy compared to control
- 10% yield increase by cleaning compared to control
- Future research should focus on measures to reduce the dust deposition

Thank you for your attention

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