

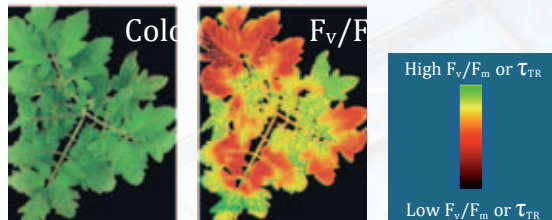


# Towards Phenotyping and High Throughput Screening Using LED Induced Chlorophyll Fluorescence Transient Imager

Wageningen UR Greenhouse Horticulture

## Objective

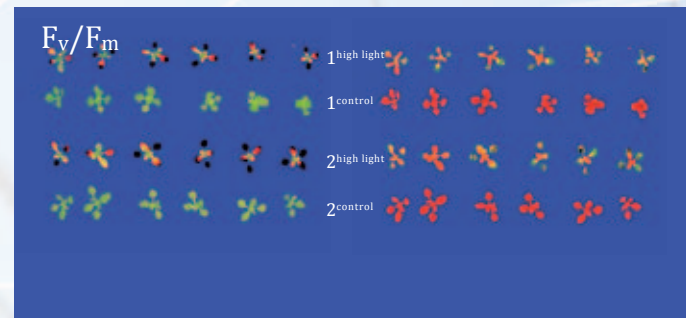
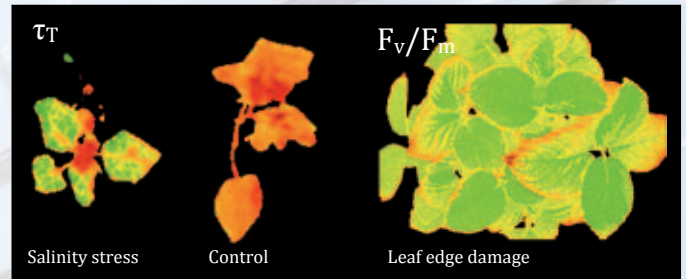
Measurement of chlorophyll fluorescence of plants provides a non-invasive technique to monitor the photosynthetic apparatus. Studies of biotic stress using chlorophyll fluorescence imaging showed heterogeneous responses over the leaf. There is great interest for an imager that can measure whole plants within a short time.



Heterogeneous response of  $F_v/F_m$  of a plant (top view)

## Methodology

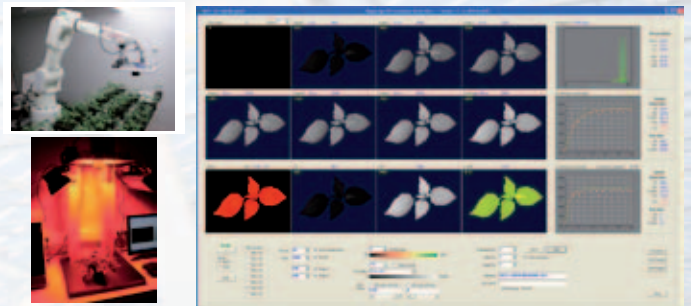
Here we present an imager that is based on the fast repetition rate fluorometer (FRRF) methodology, using longer duration of the pulses to achieve high quality images. It uses sub-saturating pulses to excite chlorophyll-a fluorescence yielding at the first pulse  $F_0$  and to achieve  $F_m$  by driving the yield of PSII photochemistry close to zero after multiple pulses. Typically 20 images within 0.36 s are captured synchronously at the corresponding light pulses. From these sequential fluorescence images two images are calculated:  $F_v/F_m$  which correlates with the maximal quantum yield of PSII photochemistry efficiency and  $\tau_{TR}$  which correlates with the time response of the measured fluorescence transient curve (Kautsky induction).



Two genotypes of *Arabidopsis thaliana* (1 and 2) which were subjected to a high light treatment of  $1300 \mu\text{mol}/(\text{m}^2\text{s})$  for 24 hours

## Results

Using this instrumentation we investigated the effect on the  $F_v/F_m$  and  $\tau_{TR}$  image for salinity stress on potato plants, early detection of leaf edge damage of *Hydrangea* and phenotyping of *Arabidopsis thaliana* accessions.



For more information:

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