USE OF LEDS IN EARLY PRODUCTION OF STRAWBERRIES

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Objective

Evaluation the effect of supplemental lighting with LEDs on growth, physiological response and yielding of strawberry plants.

Materials and Methods

Cultivation period: late winter/early spring.

TREATMENT:

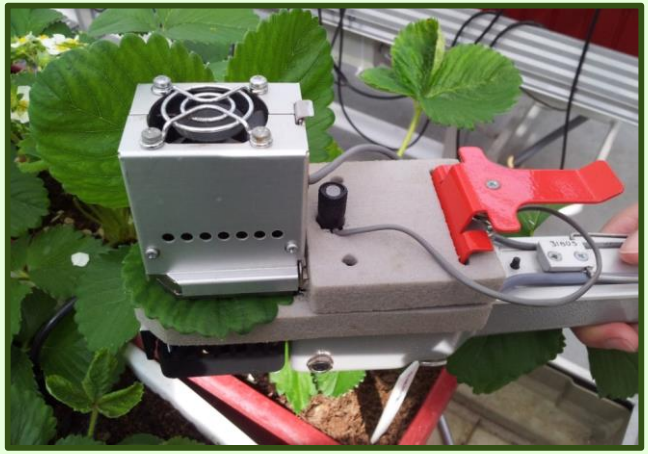
- Without supplemental lighting (control).
- Supplemental lighting with standard HPS lamps (400 W).
- Supplemental lighting with LED lamps (110 W). The spectral composition of the light emitted by the LED lamp was: 68.5% red (~665/640 nm), 28.4% blue (~445 nm) and 3.1% far red (~730 nm).

Irradiance (at the plant level) was approx. 220±20 µmol m^{-2} s^{-1}. Lighting was turned on (6 am – 6 pm) when the incoming solar radiation was lower than 100 W m^{-2}.

Materials and Methods

PHYSIOLOGICAL EVALUATION:

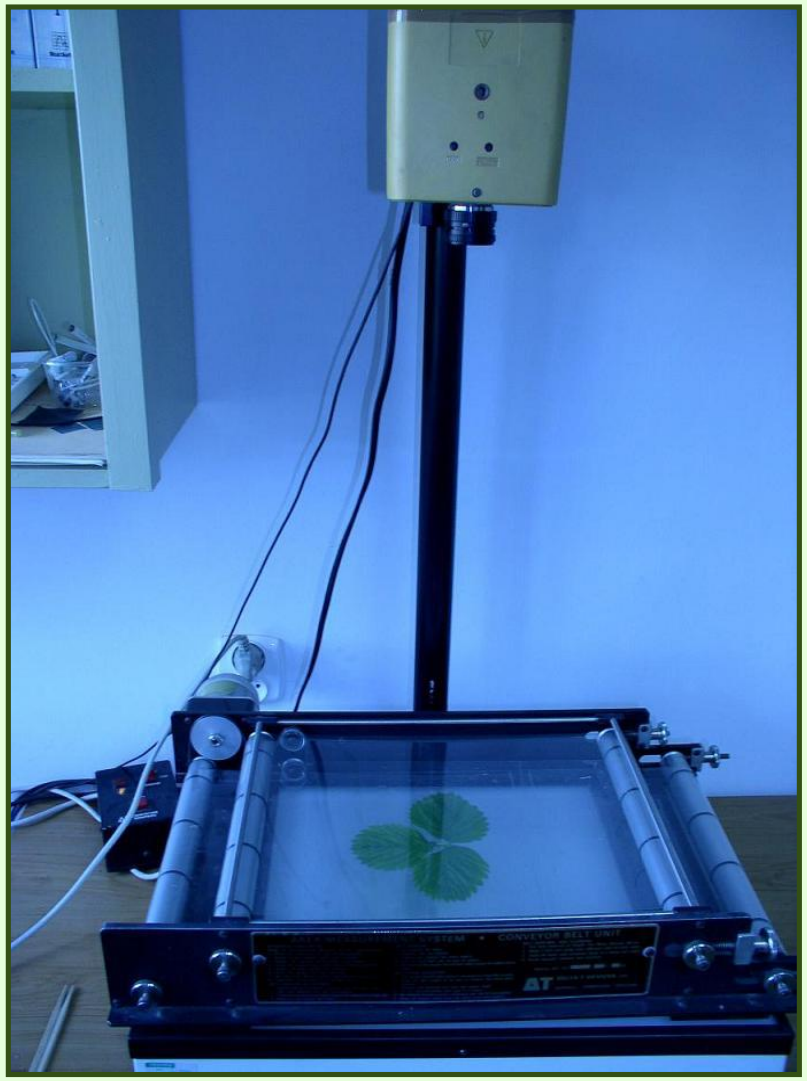
- Photosynthetic rate (gas exchange method).
- Photosynthetic activity (chlorophyll fluorescsence method).
- Relative chlorophyll content (leaf greenness).



Materials and Methods

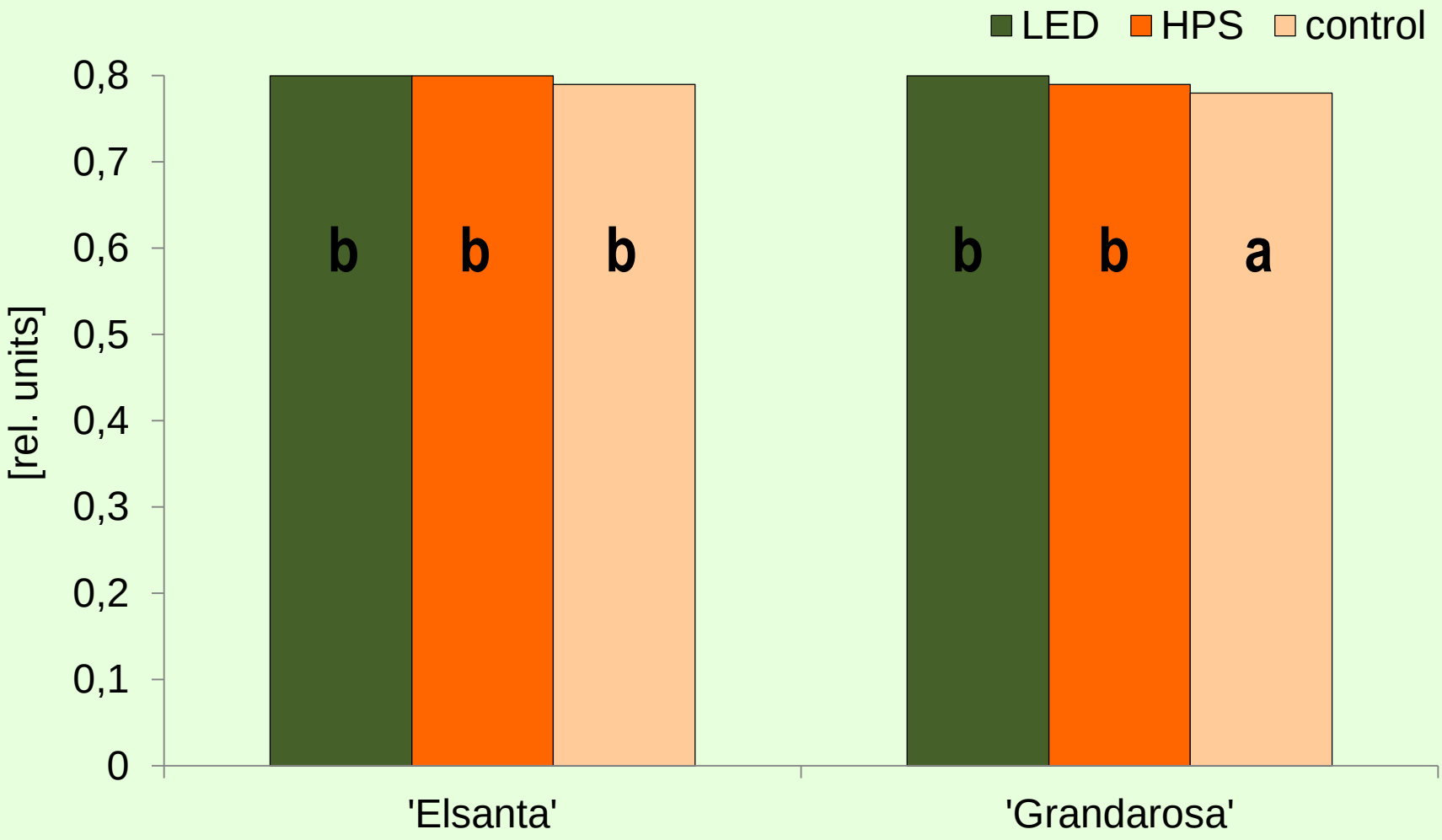
PLANT GROWTH ASSESSMENT:

- Fresh weight of leaves.
- Fresh weight of roots.
- Laf surface area.
- Crown diameter.



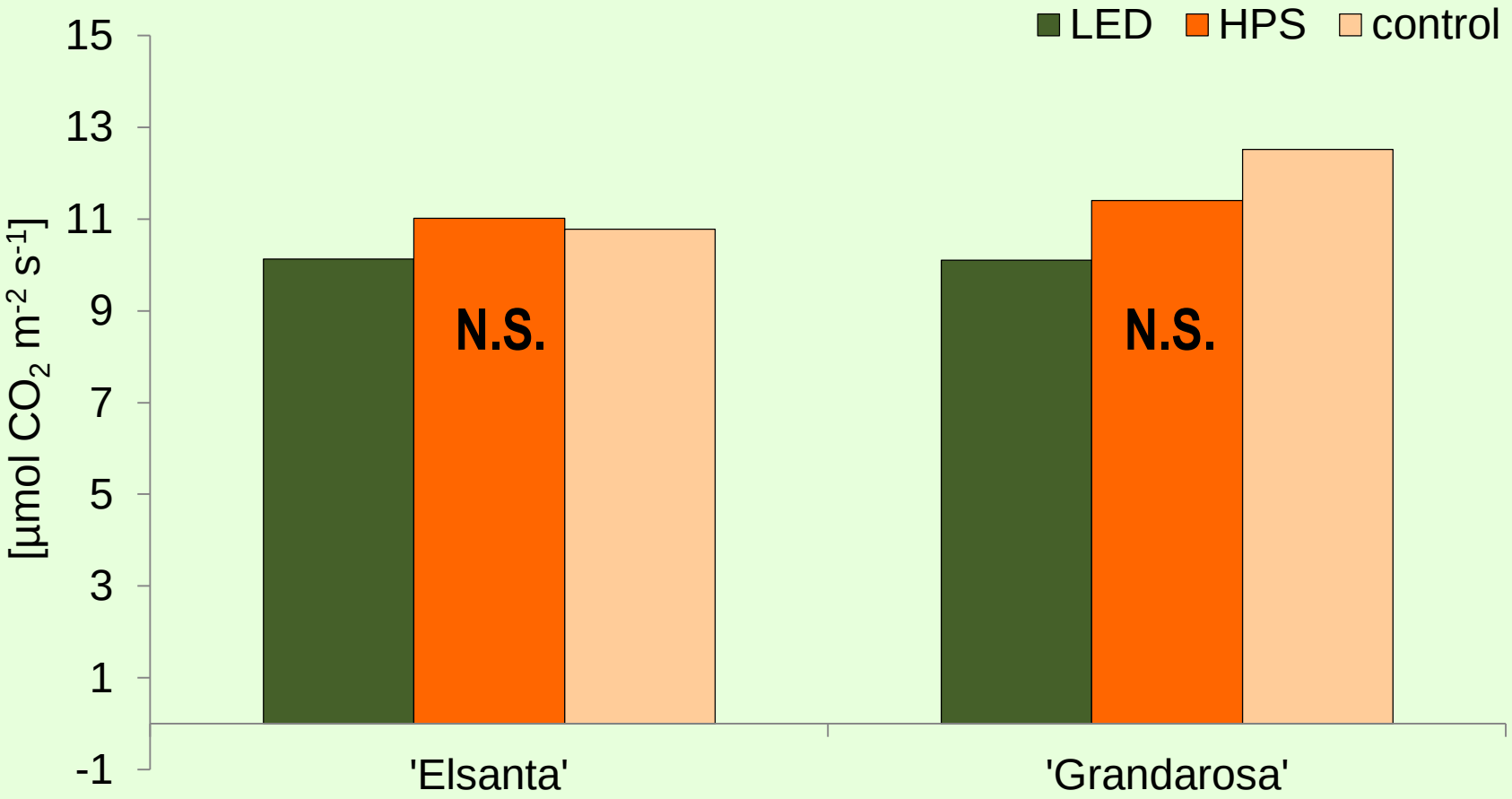
Results

Maximum photochemical efficiency (Fv/Fm)



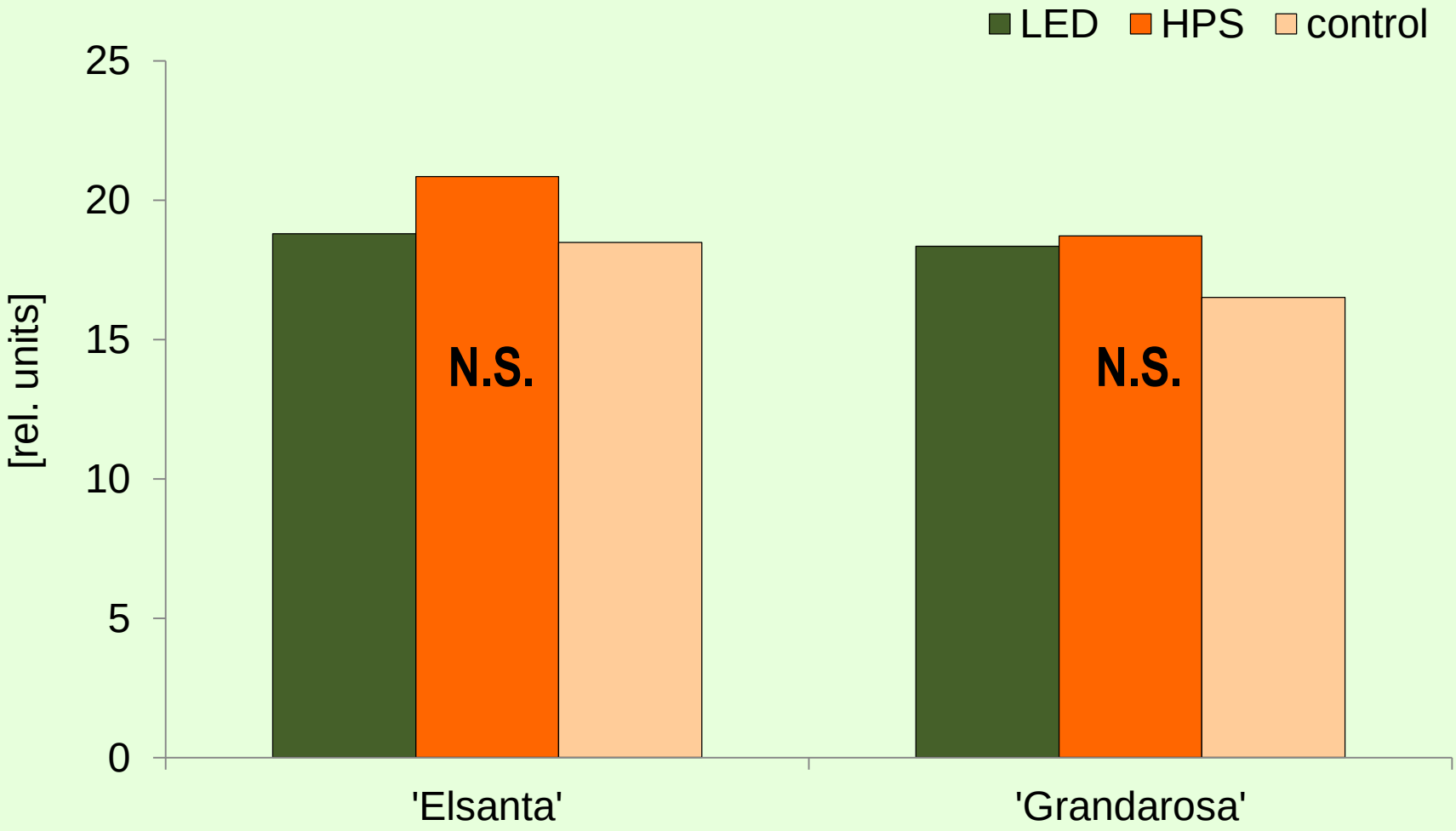
Results

Photosynthetic rate



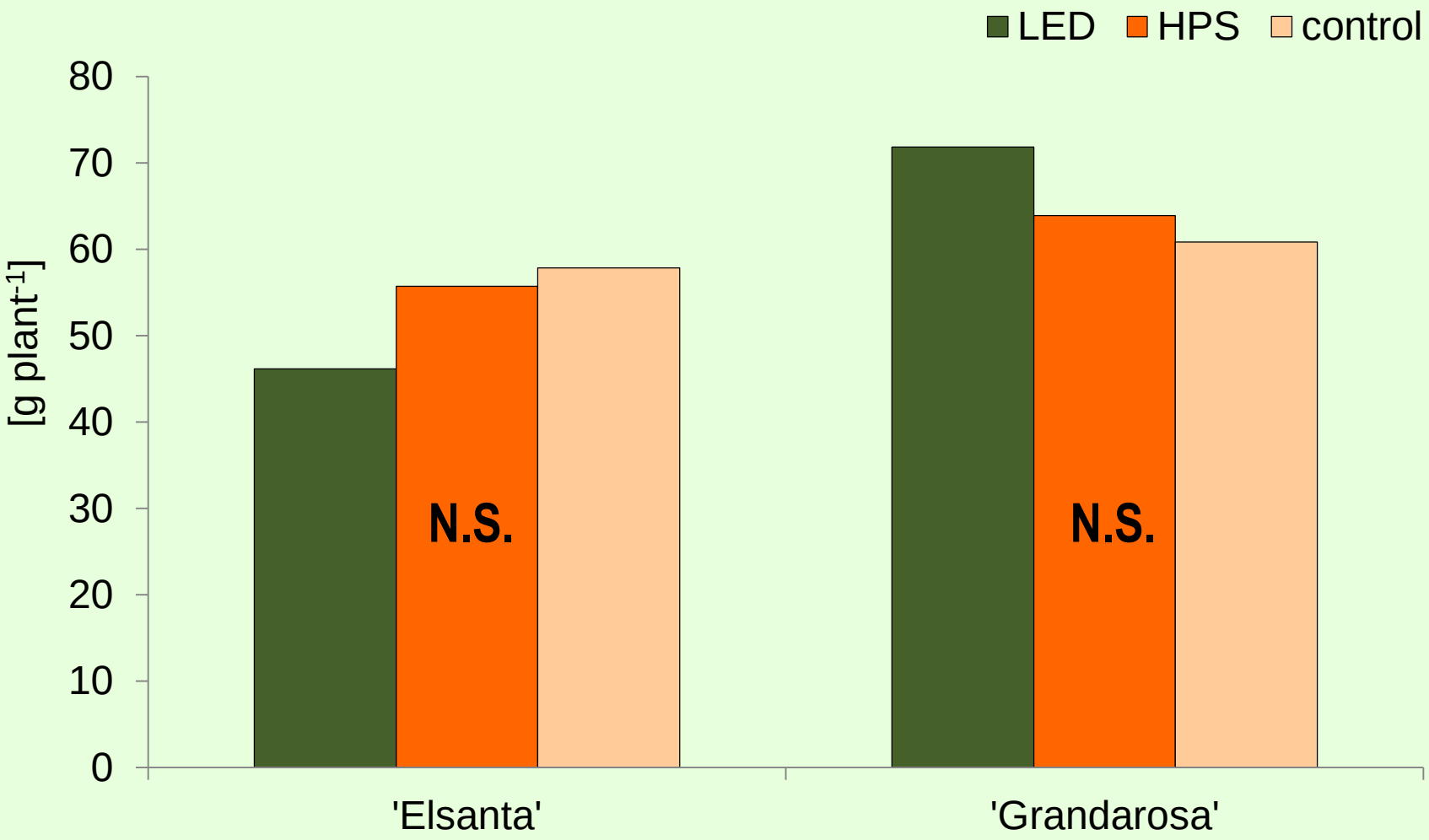
Results

Relative chlorophyll content



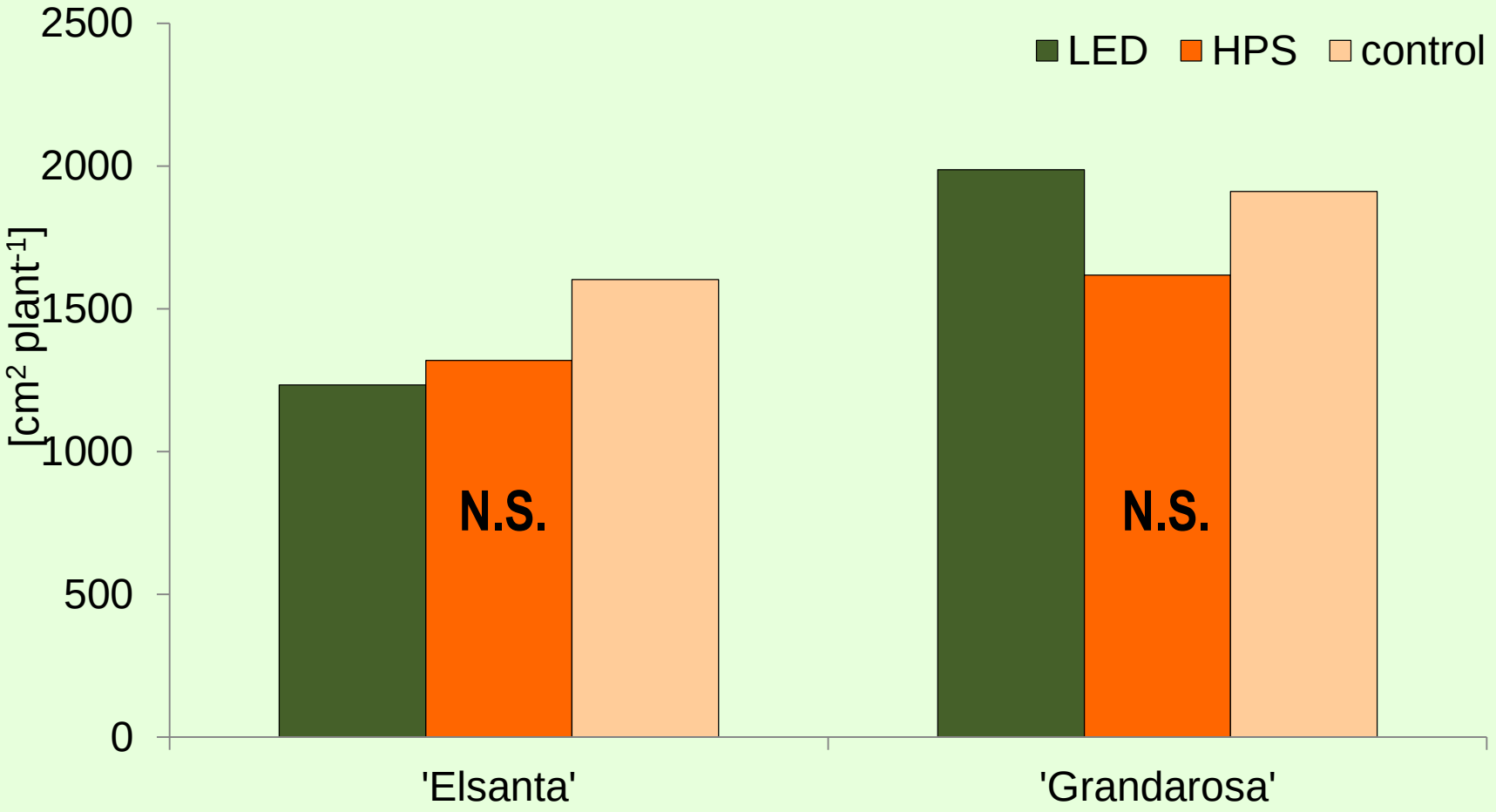
Results

Fresh weight of leaves



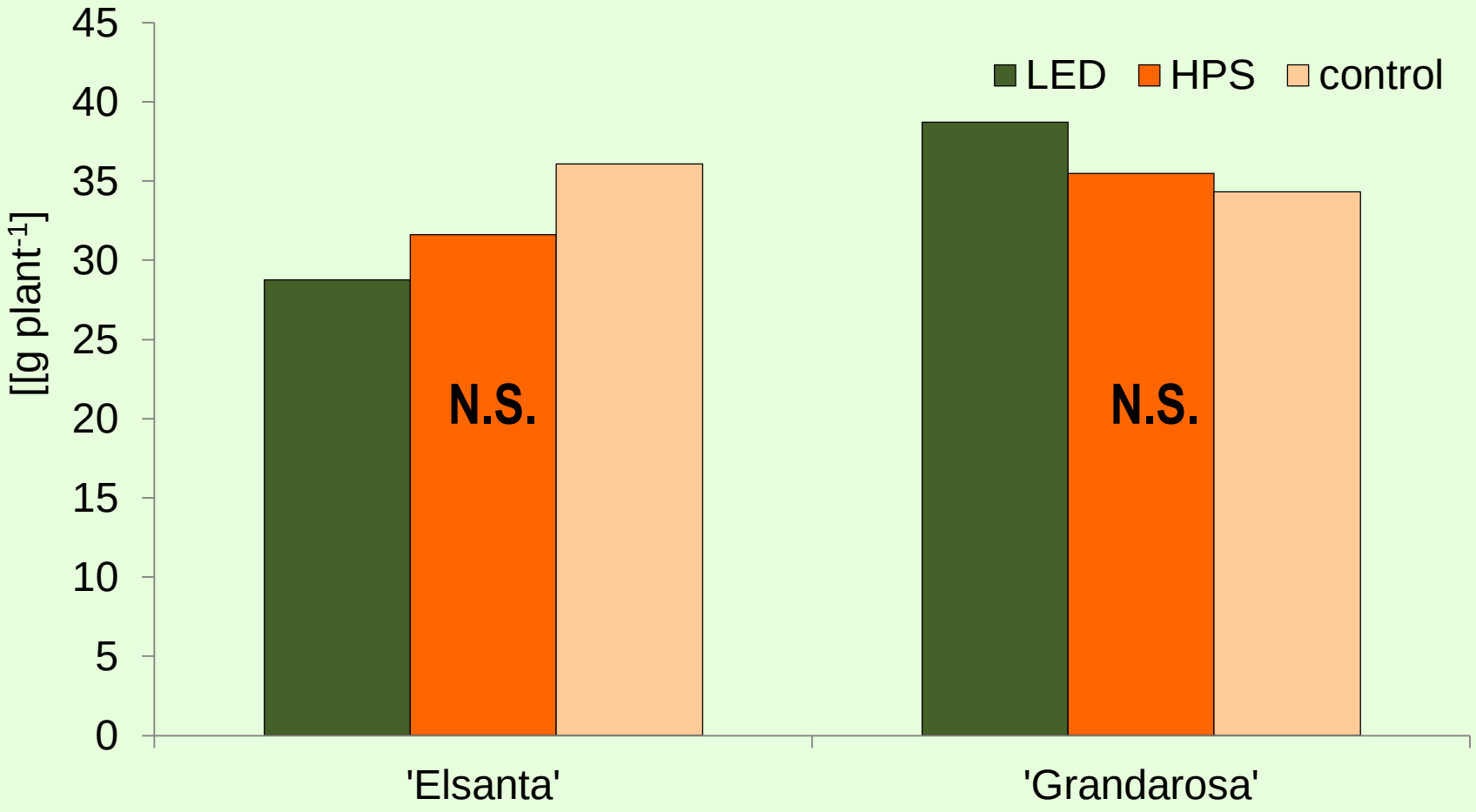
Results

Total leaf surface area



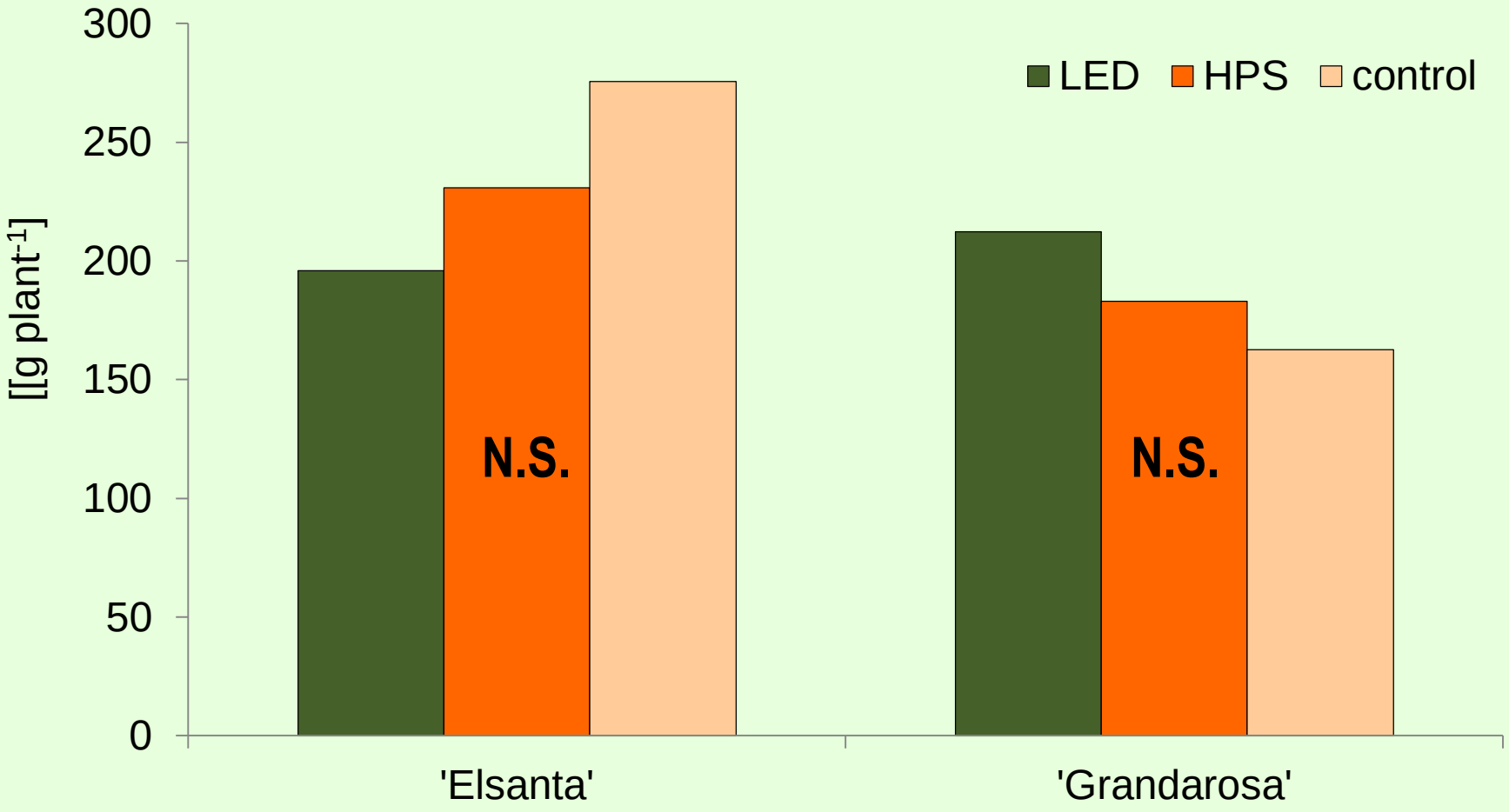
Results

Root development



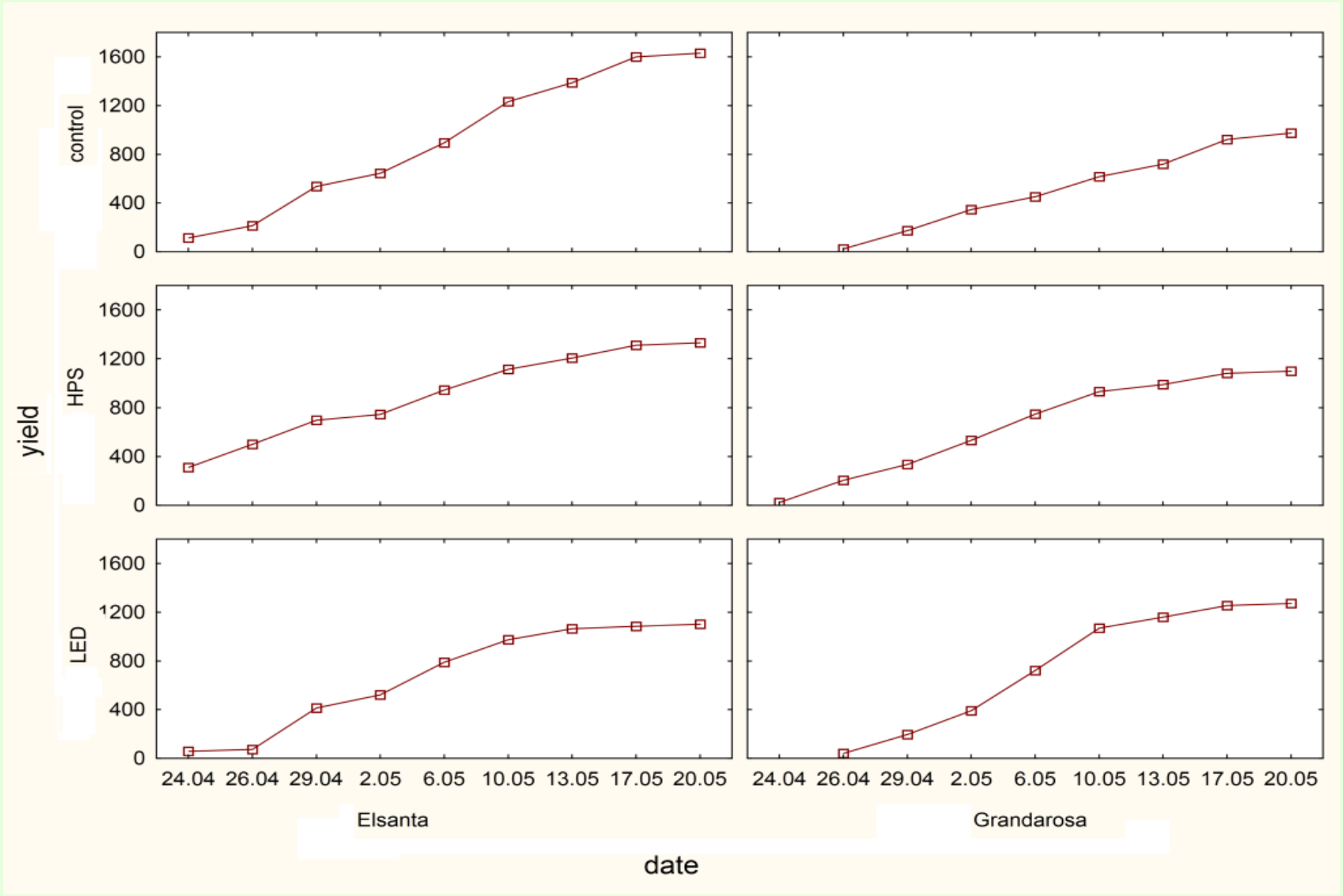
Results

Fruit yield



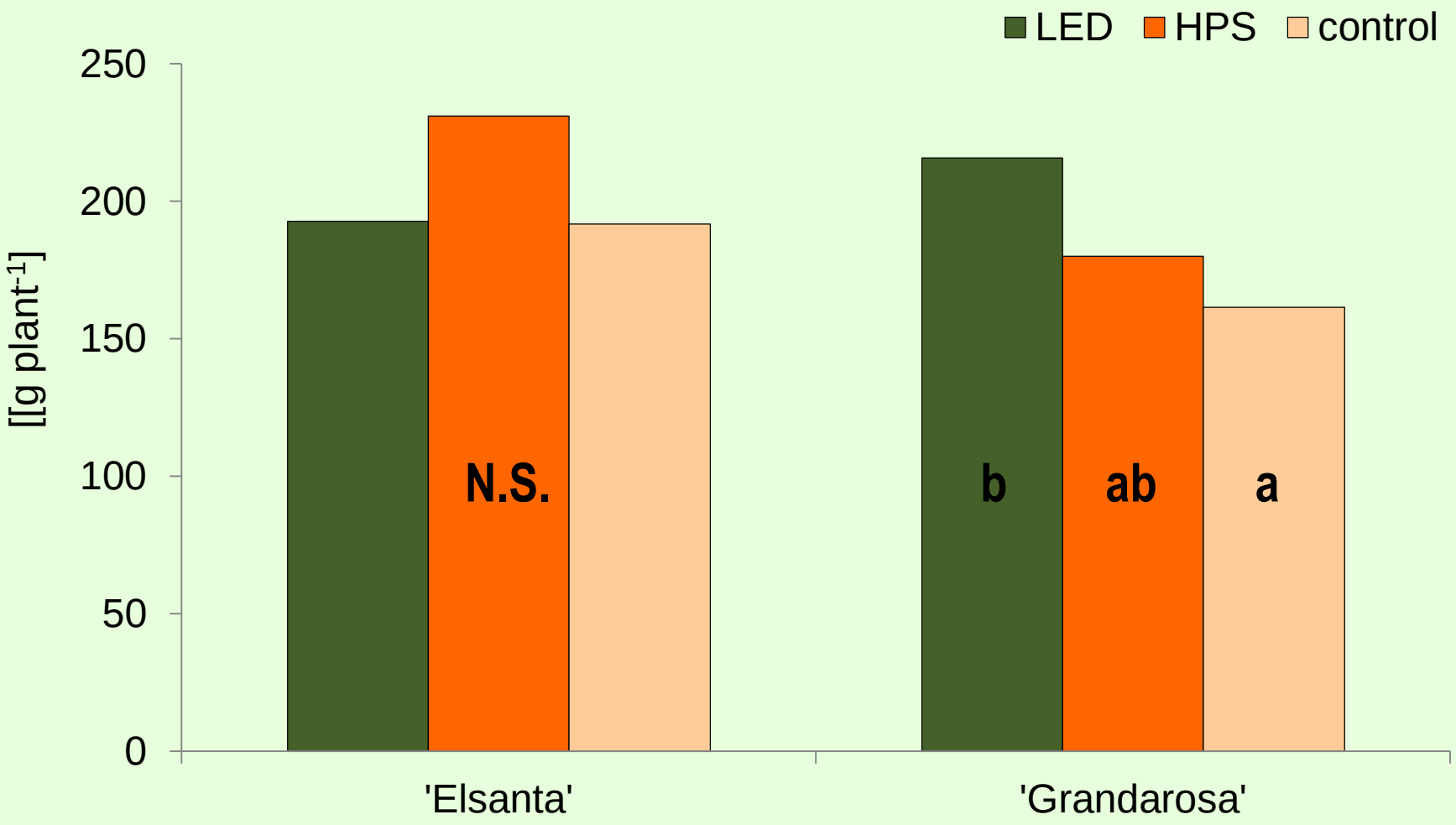
Results

Fruit harvest period (cumulative values)



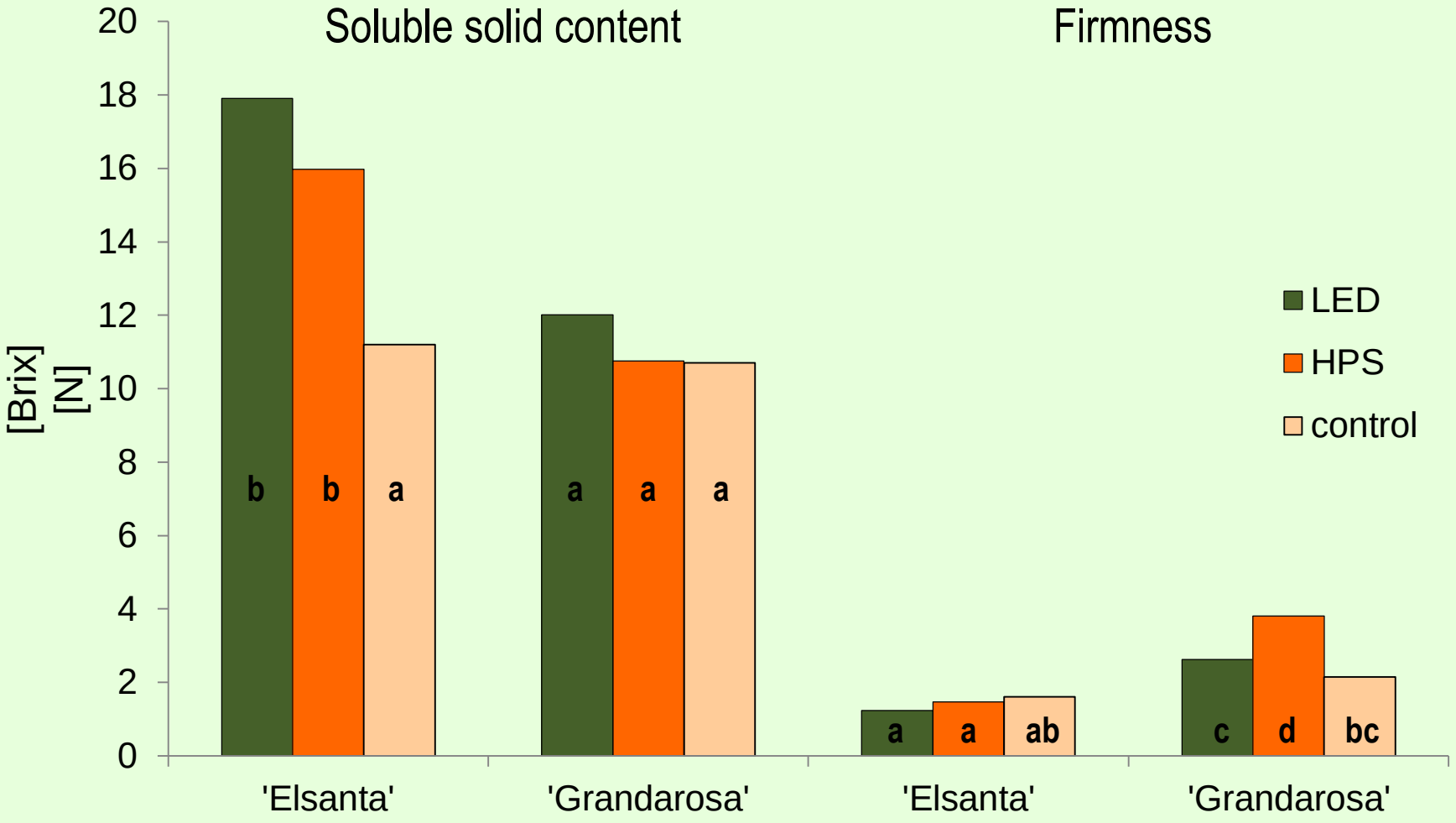
Results

Fruit yield II

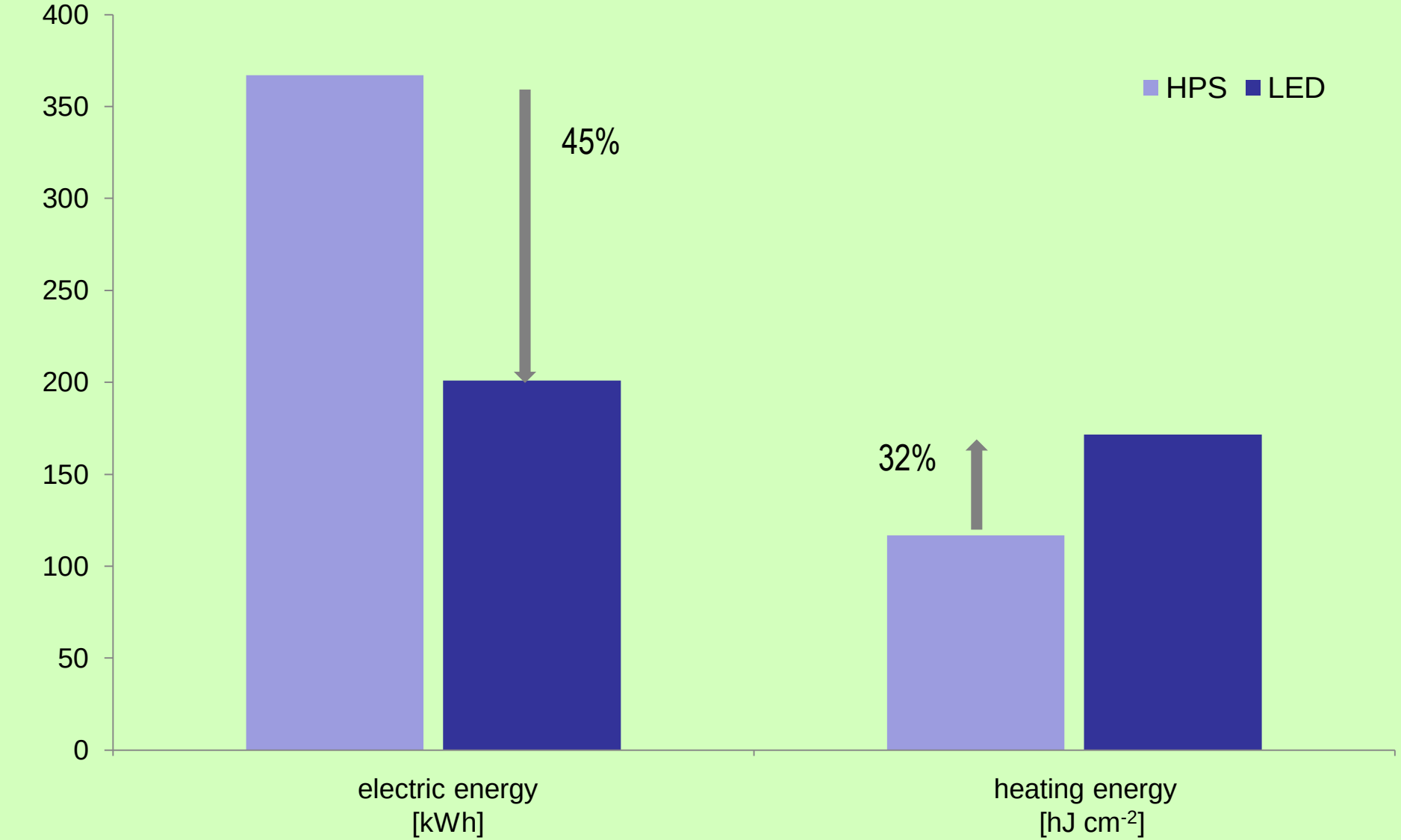


Results

Fruit quality



Results


400
350
300
250
200
150
100
50
0
HPS
LED
45%
32%
electric energy
[kWh]
heating energy
[hJ cm-2]

Conclusions

No significant influence of supplemental lighting on efficiency of photosynthetic apparatus was recorded.

No differences in plant growth between lighting regimes were observed.

Cultivar ‘Elsanta’ gave higher yield (on average) than ‘Grandarosa’. However no significant effect of additional lighting with LED on plant productivity was found.

”The sustainable improvement of European berry production, quality and nutrition value in a changing environment: Strawberries, Currants, Blackberries and Raspberries”.

Work package: Improved cultivation techniques.
Task 2.1 Cultivation techniques for season extension.
Subtask 2.1.1. Controlling plant development for season extension.