

Optimizing strawberry plant propagation in a controlled environment ecosystem

Claerbout Jolien¹, Craeye Simon¹, Garmyn Maarten¹, Derucyk Bert¹, Ameye Maarten¹

Inagro vzw, Ieperseweg 87, 8800 Rumbeke-Beitem, Belgium

Contacts: Jolien.claerbout@inagro.be



Introduction

Strawberry plants in Belgium are traditionally propagated in open-air tray fields during summer and autumn. However, climate variability affects plant growth and flower induction, and open-field propagation increases the risk of disease introduction. The conventional system also relies on long cold storage periods, which often lead to quality loss. It also results in harvesting peaks in everbearers. Fresh plants offer a promising solution to smooth out these peaks, but year-round production of fresh plants is not feasible in open-air conditions.

To address these challenges, this study investigates how controlled environment ecosystems - focusing on humidity control and light quality - can optimize initial rooting and plant development and improve overall plant quality.

Key findings

Root development

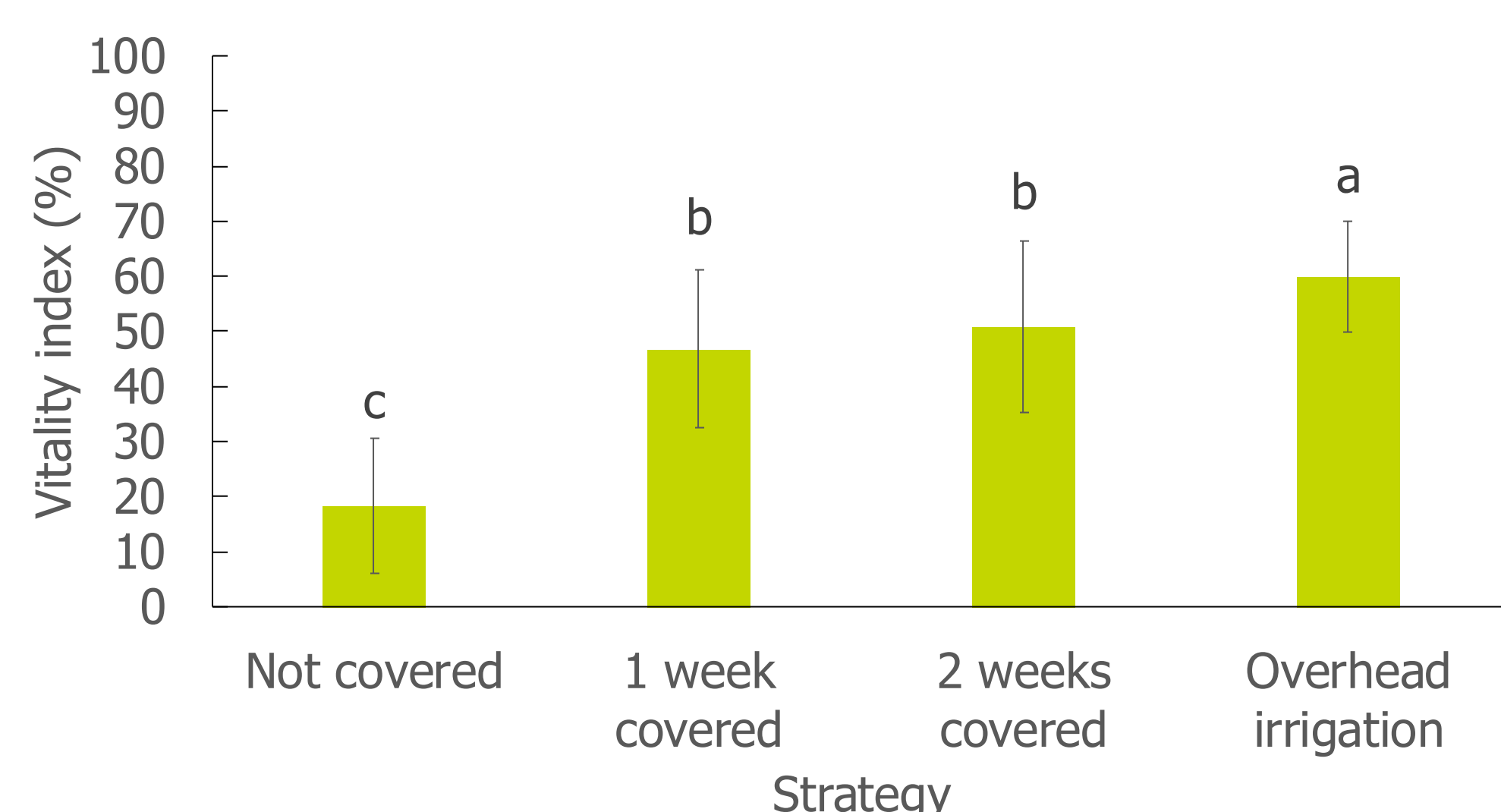


Figure 1 : Vitality index (%) of the trayplants. Index is calculated based on 9 plants where a scoring of 0 (dead) – 3 (4 or more leaves after plant care) was used. Different letters above the bar indicate significant differences (Tukey test, $p < 0.05$). Error bars represent the standard deviation ($n = 40$).

- Optimizing rooting after planting cuttings is critical to ensure strong plant vitality.
- Overhead irrigation promotes superior root development and enhances overall plant strength.
- Plastic covering and ebb and flow irrigation were comparatively less effective in supporting early plant growth.



Influence of light spectrum on June-bearers

- Far-red light promoted more elongated growth during propagation.
- Yield response to far-red light was cultivar-dependent.
- For Sonsation, far-red light during propagation increased yield by 21–34% compared to white or red-blue light strategies (Fig. 2).
- Far-red light reduced runner formation and led to more flower trusses during production (data not shown).

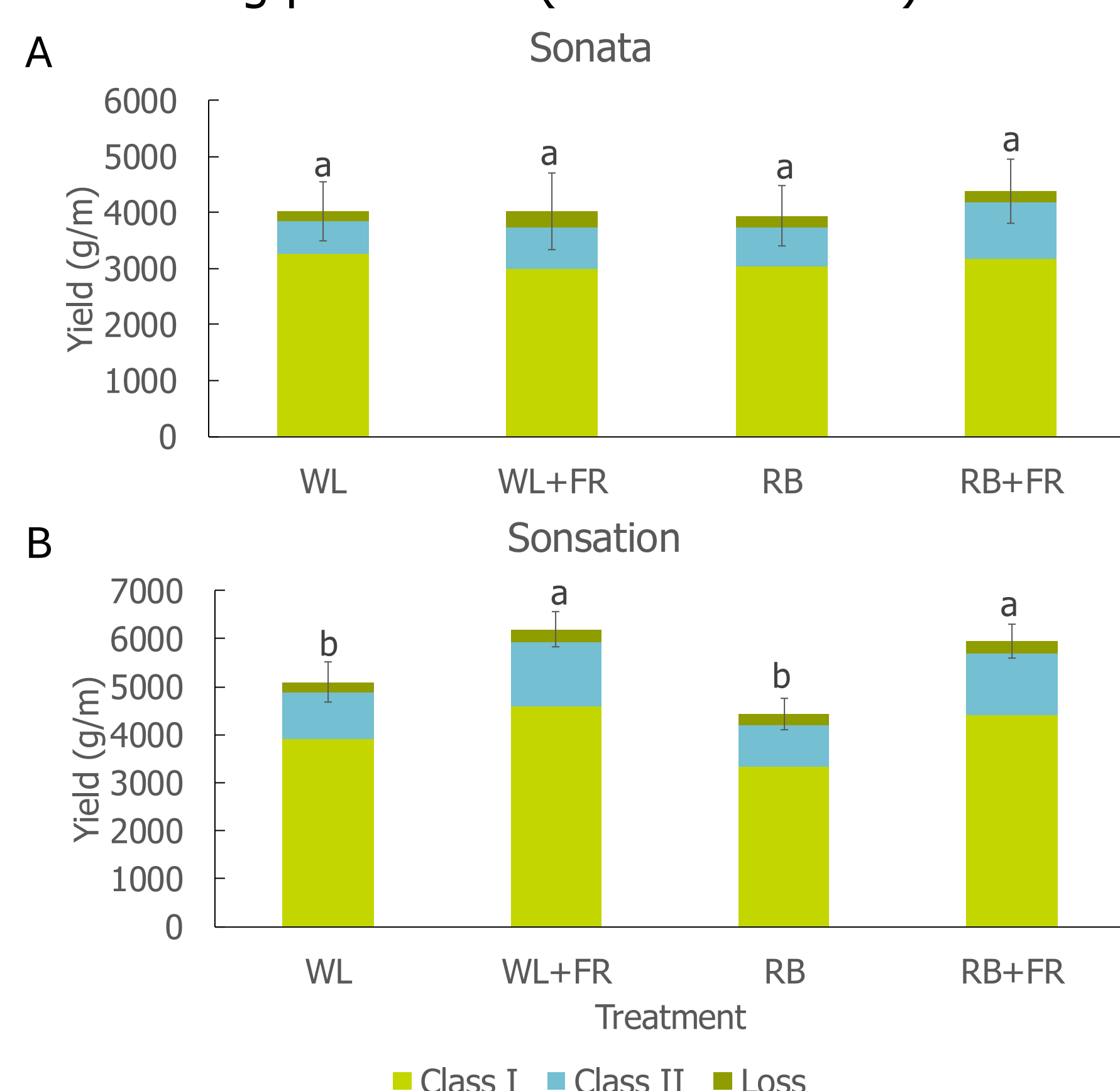


Figure 2 : Yield and sorting per light spectrum and cultivar Sonata (A) and Sonsation (B) during the production phase. WL = white light ($245 \mu\text{mol}/\text{m}^2/\text{s}$), WL+FR = white light amended with far-red ($100 \mu\text{mol}/\text{m}^2/\text{s}$), RB = red-blue (225 and $20 \mu\text{mol}/\text{m}^2/\text{s}$), RB+FR = red-blue amended with far-red ($100 \mu\text{mol}/\text{m}^2/\text{s}$). Different letters above the bar indicate significant differences (Tukey test, $p < 0.05$) in total yield. Error bars represent the standard deviation of the total yield ($n = 4$).



Influence of light strategies on fresh plant propagation of everbearers

- Plant propagation lasted only 6 weeks, using targeted light strategies.
- Far-red light promoted more elongated growth during the propagation phase (Fig. 3).
- By June 1, 2025, yields ranged from 3.2 to 4.4 kg/m, following planting on March 4, 2025 at a density of 6 plants/m.
- Addition of far-red light tended to increase yield, although differences were not statistically significant (Fig. 4).



Figure 3 : Cultivar Florice at the end of propagation phase



Figure 4 : Yield and sorting per light strategy ($188 \mu\text{mol}/\text{m}^2/\text{s}$) and cultivar Karima and Florice during the production phase. SD = short-day for 3 weeks (10h), LD = long-day for 3 weeks (16h), FR = amended far-red for 3 weeks ($50 \mu\text{mol}/\text{m}^2/\text{s}$). Different letters above the bar indicate significant differences (Tukey test, $p < 0.05$) in total yield. Error bars represent the standard deviation of the total yield ($n = 4$).

Conclusions

Overhead irrigation significantly improves rooting and plant vitality during propagation. Far-red light enhances yield in specific June-bearing cultivars like Sonsation and reduces runner formation. These findings demonstrate that tailored climate and light strategies in controlled environment ecosystems can boost strawberry production efficiency.

Ongoing research is focused on further investigating the role of light strategies in the propagation of everbearing cultivars.