

Year-round production under LED with fresh Junebearers

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Motivation and background

- ✦ Standard practice: Single chilled Junebearer cultivation disadvantages:
 - long pre-harvest period of vegetative development and a relatively short harvest period.
 - new plants every round → more plant and labour costs
- ✦ New concept: Year-round strawberry cultivation with Fresh (winter) lighted Junebearer advantages:
 - Higher production potential (one pre-harvest phase where a vegetative crop is heated)
 - Higher quality product because peaks are avoided
 - More energy efficiency (Plant Empowerment principles)
- ✦ Induced cultivation with constant flower induction & balanced plants



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Program

- ✦ Motivation and background
- ✦ Trial 2022-2023
- ✦ Cultivation concept 2022-2023
- ✦ Results 2022-2023
- ✦ Conclusions cultivation
- ✦ Conclusions energy
- ✦ Follow up trial

Partners



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Motivation and background

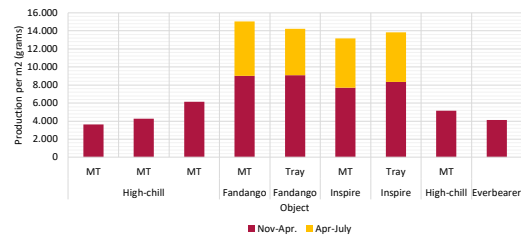
- ✦ Goal: year-round production with one Junebearer planting just like tomato
- ✦ Junebearer needs a short day to induce new trusses
 - PROBLEM: lower light sum during short days in winter leads to reduced production
- ✦ SOLUTION: let the plant experience a short day while keeping the light sum high and lighting a long day
 - misleading LED lighting



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Trial 2022-2023 – First trial at Delphy ISFC

- After trials at Plant Lighting → first trial at Delphy ISFC in 2021
- Several high-chill and some low-chill varieties
- Trays and mini-trays
- Tipped week 30 on trayfield, planted in the greenhouse week 38
- Around week 15 high-chillers were removed → focus on low-chill varieties
- Earlier production by shortening days on the trayfield next year → More GDH



High-chill variety



Low-chill variety

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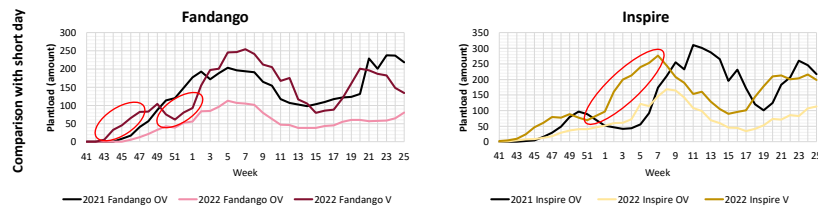
Trial 2022-2023 - Cultivation concept

- Varieties (Fandango and Inspire) → Low chill
- Planting types Mini-tray, Plug and Tray
- Tipping dates: - Darkened plants June 2nd (week 25)
- Non-darkened plants July 26th (week 30)
- Start covering plants → August 8th till September 9th
- Planted in the greenhouse 2 compartments September
→ Long day = 12 hours cyclical lighting + 6 hours pure red light
→ Short day = 12 hours with cyclical lighting
- Same light sum in both compartments, but higher light intensity in the short-day greenhouse
- Energy goals:
 - Winter max 5m³/m²
 - Year-round 100kWh/m²
- Started shortening day length with screens when natural day length increased → longer flower induction



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Results 2022-2023 - Plantload



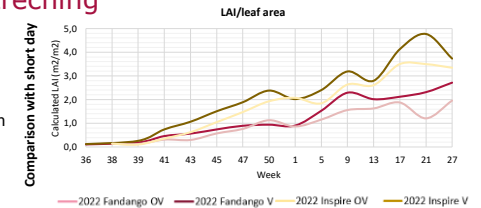
- Earlier production with darkening plants on the trayfield, Fandango and Inspire
- No use of flowering bulbs in November like 2021 to prevent over lighting Inspire → Dormancy
- Second half of December → dormancy becomes visible →



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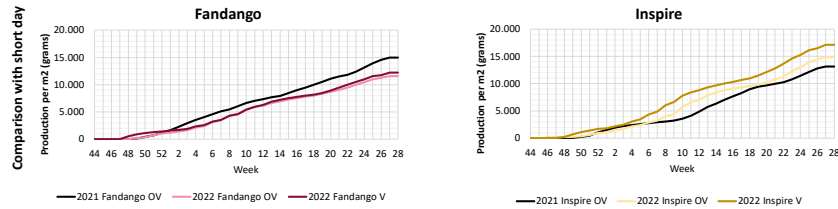
Results 2022-2023 – LAI/stretching

- Almost no differences in LAI between compartments
- Visible less stretching in Fandango in autumn compared to Inspire



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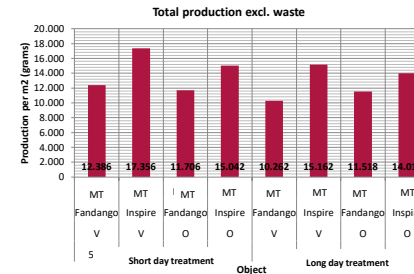
Results 2022-2023 - Production



- ✦ Higher production in short day compartment
- ✦ Fandango → lots of potential was lost due to dormancy
- ✦ Inspire this trial not over lighted → better production this year

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Production 2022-2023



- ✦ Start actively darkening plants in the greenhouse with increasing natural daylengths
- ✦ After week 27 plants transplanted to other compartment → 2 kg/m² of harvest darkened Inspire (lower quality → mildew)

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Conclusions - Cultivation

- ✦ Darkening the plants on the trayfield results in earlier production
- ✦ Potential reached of almost 20 kg/m² (including production in another compartment)
- ✦ There is a potential for good quality fruit, but → Plants need to be kept out of dormancy (results in poor stretching, fruit quality, tip-burn and the plant is out of balance → lower production)
- ✦ Fandango was more sensitive to dormancy
Dormancy was seen in both autumn and spring



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Conclusions - Energy

- ✦ Energy wise the goals were realistic:
 - Winter max 5m³/m²
 - Year-round 100kWh/m²
- ✦ A fresh lighted Junebearer cultivation fits within the Plant Empowerment principles:
 - Maximum screening in the winter
 - Overall, a cultivation with higher temperatures
- ✦ By using LEDs and a spectrum with a high fraction of energy-efficient red light, it is possible to half the energy input from 200kWh/m² to 100kWh/m²
 - 12-hour compartment is easier to steer compared to 18-hour compartment (more problems with humidity → costs more gas)
- ✦ The gas usage can be minimised by using transparent energy and a light emission screen from 15 to 7,5m²/m².

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Follow up trial 2023-2024

- ✦ Again, early production → darkening plants on trayfield
- ✦ Base: up to 13.5 hours of PAR
 - Assimilation lighting up to 13.5 hours + possibility EOD flowering bulbs when needed
 - End of day red light
 - Steering on dormancy suspicion
- ✦ Focus on Fandango and Inspire
- ✦ 3 sections
 - Section 1 use of flowering bulbs focus Inspire
 - Section 2 use of flowering bulbs focus Fandango
 - Section 3 Fandango and Inspire under long day with EOD red light
- ✦ Goals:
 - Aim for 20kg/m²/year
 - Stay away from dormancy!
 - Growing in balance / predictability assimilate balance
 - Maximum 7.5m³ gas for whole crop year

This trial will be visited during the Fieldtrip tomorrow!



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Thank you for your attention!

Feel free to contact me for questions

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