

## High production with intensive blueberry cultivation

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ISFC 2024



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- ✦ Container size
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## Improve cultivation results: motive

- ✦ The cost of blueberry production has significantly increased due to inflation affecting necessary production inputs such as fuel, energy, labour, fertilizers, and crop protection products.
- ✦ To improve the profitability of blueberry cultivation, some adjustments may be required.
- ✦ The main questions are which varieties are worth planting and how the crop should be planted and maintained.

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## Substrate cultivation

- ✦ Independent of location and soil
- ✦ Fewer problems with soil diseases
- ✦ Nutrition supply can be controlled
- ✦ Better controllable growing
- ✦ Type of substrate with more air:
  - pF-curve -10 cm: >30% air, 50-55% peat

## Improve cultivation results: setup of trials

- ✦ Intensive cultivation techniques: the aim of optimizing the cultivation result.
- ✦ Growing in pots under rain covers, high plant density, applying different pruning methods, and integrating digitalization.
- ✦ On March 16, 2022, the five most important current varieties were planted:
  - the early variety 'Duke'
  - the mid-season varieties 'Cargo' and 'Calypso'
  - novelty 'Titanium'

## 2D-system: Summer pruning comparison (week 32,2022)

- ✦ Normal summer pruning: only the oldest branched are removed



Photo: 26 June (week 26, 2023)

## 2D-system: Summer pruning comparison (week 32,2022)

- ✦ Normal summer pruning + tying up the longest 1-year-old-caness



Photo: 26 June (week 26, 2023)

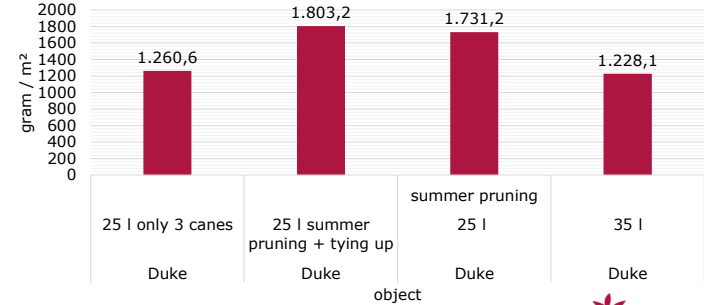
### 2D-system: Summer pruning comparison (week 32,2022)

- Only 3 canes per plant were kept and tied.

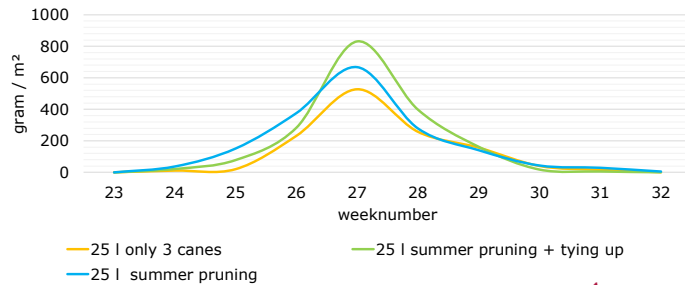


Photo: 26 June (week 26, 2023)

### 2D-system: production 2023



### Summer pruning comparison: production pattern



### Fruit quality

- Very high quality of the berries: dry plants as they grow under rain covers all season
- The average fruit weight:
  - Duke: 1.5 grams
  - Titanium 1.2 grams
- Larger berries: more light to the bottom of the plants
- At the end of August 2023, the plants were pruned again: to monitor the coming second production year.



### Container size

✦ 25-liters pot with 0.96 plants per m<sup>2</sup>

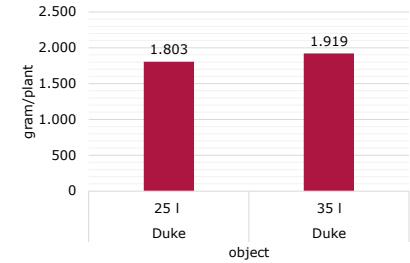


✦ 35-liters pot with 0.64 plants per m<sup>2</sup>

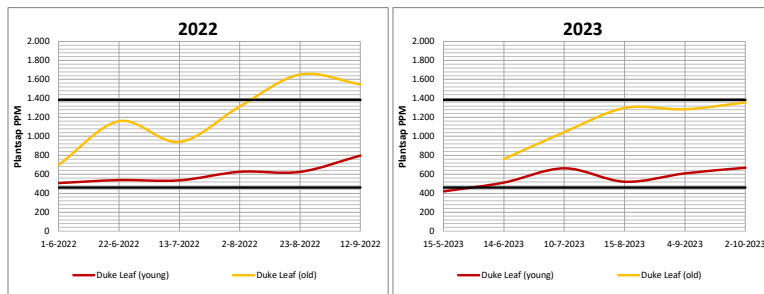


### Container size: production at Duke

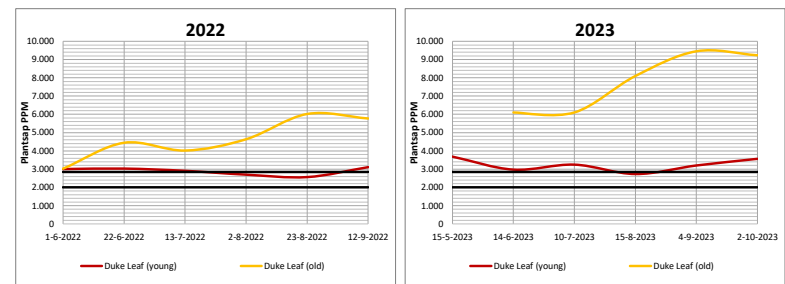
- ✦ 25-liter pot had 6% lower production per plant than a 35-liter pot
- ✦ Per square meter, the production was 30% higher.
- ✦ The plant becomes more lightning and has more space in a 35-liter pot.



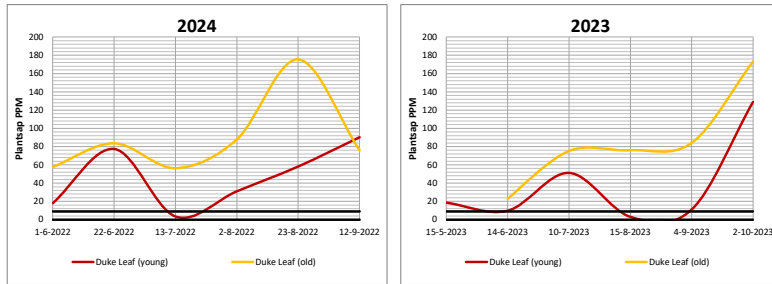
### Plantsap: Calcium levels were sufficient



### Plantsap: High Potassium at end of cultivation



## Plantsap: NO<sub>3</sub> -> High Nitrate levels

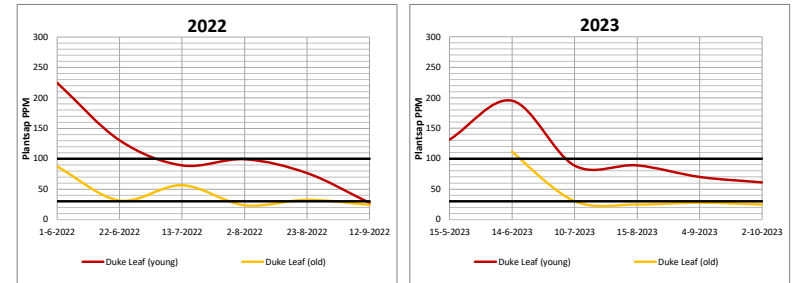


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## Plantsap: NH<sub>4</sub> -> ammonium levels were sufficient

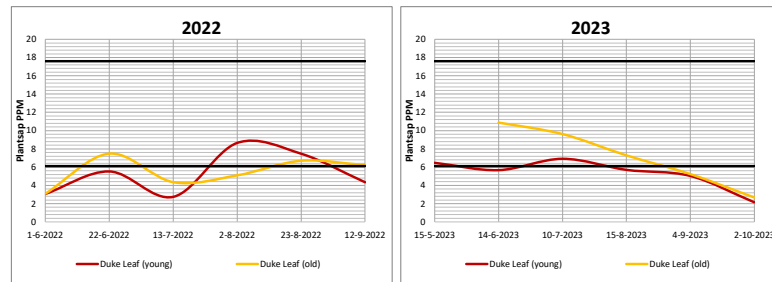


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## Plantsap: Fe -> increasing the Iron application



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## Nutrient absorption: plantsap analysis

- ✦ Blueberries require a special feeding schedule and water supply.
  - Calcium plays an important role as a building block for cell walls and membranes and thus contributes to the firmness of the fruits. It is an important element for cell division and growth of young tissues and promotes the quality of the fruits.
  - High Potassium levels during fall are desired to harden off the plants for the cold winter period.
  - 1 to 3 ratio of the apply of NH<sub>4</sub> to NO<sub>3</sub> -> Nitrate levels were high, while it is stated that a blueberry plant absorbs it poorly.
  - Increasing the Iron-applying during the cultivation which is needed for the formation of chlorophyll (and photosynthesis).
  - At a pH around 4.5 in the soil, trace elements such as manganese (Mn), iron (Fe), copper (Cu) and zinc (Zn) can be easily absorbed.

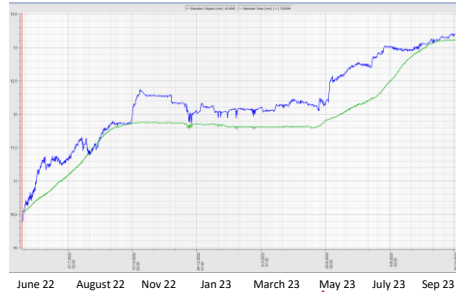
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## Plantactivity: stem growth 3-6-2022 till 21-10-2023

- ✦ 1-year-old cane od 'Duke': no growth between 10-10-2022 and 10-5-2023.
- ✦ Growth of diameter of the canes starts after flowering.
- ✦ Increase of 4,5 mm in 1 growing season.



## System approach

- ✦ Different pruning strategies and 2D crop had promising first productions and good fruit quality.
- ✦ New insights in the uptake of NH<sub>4</sub> and NO<sub>3</sub>: high levels in plantsap.
- ✦ Irrigation of blueberries is not as straight forward as traditionally.
  - Sensors give good indication of performance
  - Drain steering not accurate, desire for digital assistance

## Steps for the future?

- ✦ **Objective 2024: 3 kg/m<sup>2</sup>**
- ✦ Link sensor data to irrigation
- ✦ 2D cultivation with smaller pots → steerability irrigation/fertigation + higher plant density?
- ✦ Propagation of long canes:
  - First year directly serious yield
  - A more valuable plant in propagation
  - Less accretion costs for a production field
  - Potential for higher productions and better fruit quality
  - Faster rotation of plants/varieties



Thank you for your attention!

Feel free to contact me for questions:

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