



Effect of season extension on high-bush blueberry in high latitude conditions.

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Seminar of EUBerry WG2 related topics - Improved cultivation technique of berries.
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EUBerry project

Ensuring profitable berry production in changing climate

Task 2.2. P7



Sub-Task 2.2.2 Identifying the impact of changing climate on perennial berry plants – Blueberry

- The effect of growing conditions: increased temperature and elongated growing season in a walk-in plastic tunnel vs. in the open
- Field trial in 2011—2013--?



Tunnel trial at MTT Piikkiö, Kaarina, Finland

Latitude 60° 39' N

Longitude 22° 55' E

- Plastic cover raised in spring
removed late in autumn,
- Tunnel ventilated in summer
(sides and doors)
- Natural light only
- Bumble bees and bees as
pollinators
- No pest or disease control
- Finnish cultivar 'Arto'



Tunnel trial at MTT Piikkiö, Kaarina, Finland

Observations:

- Plants
- Air temperature
- Soil temperature
- Use of water



We studied plant phenology, vegetative growth, flowering and yield of a half-high blueberry



Vegetative development (2012)

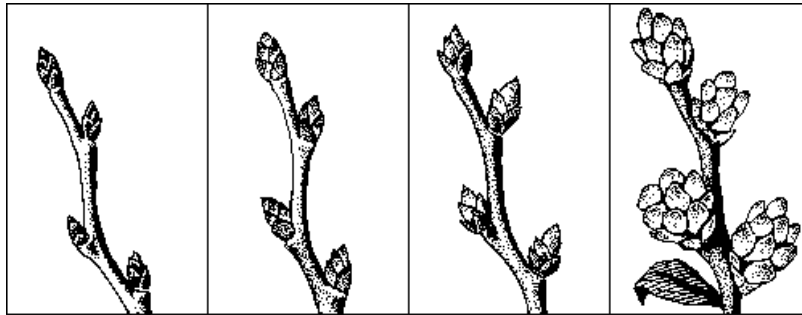
Walk-in tunnel conditions

- Advance bud break by 6 days
- Advance different growth stages of leaf buds by 4—9 days
- Delay autumn colours and leaf fall by 2—3 days



Generative development (2012)

<http://www.omafr.gov.on.ca/english/crops/pub360/5blustages.htm>



Dormant

Bud Swell

Green Tip

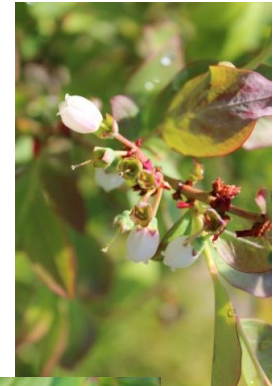
Bud Cluster



Pink Bud

Bloom

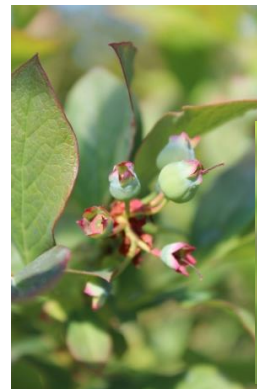
Petal Fall



Ca yx

Green Fruit

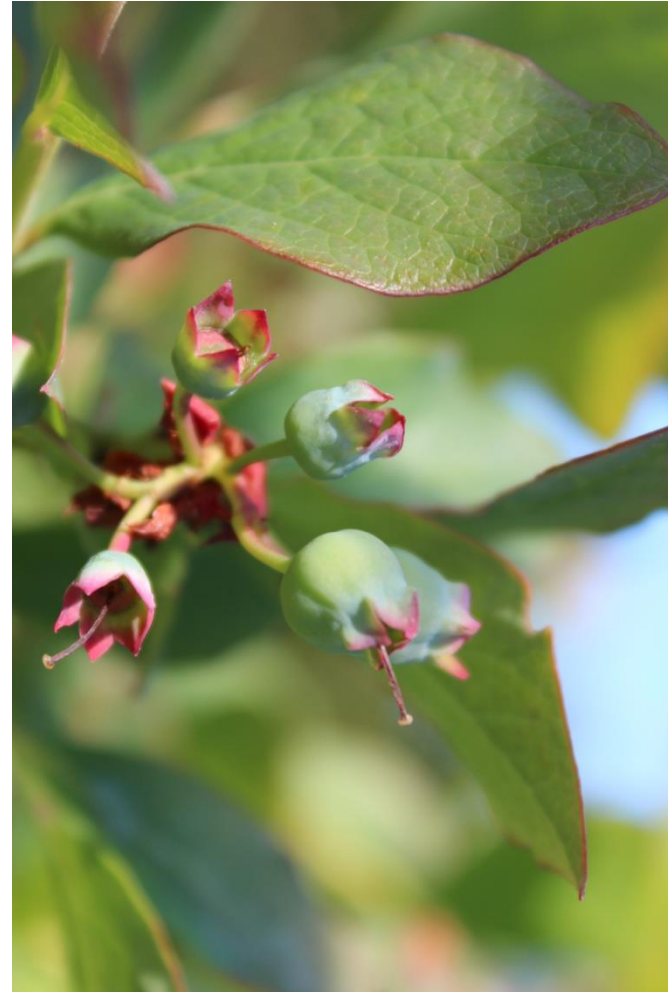
Fruit Ripening



Generative development (2012)

Walk-in tunnel conditions

- Advance different growth stages of flower buds by 8—12 days
- Make flowering time 3 days shorter
- Advance berry ripening stages by 4—5 days
- Make berry development time 3 days longer



Generative properties (2012)

Compared to open air condition (100%), in the Walk-in tunnel conditions:

In heathy shoots:

- Number of flowers per shoot: 154%
- Berries-per-flowers ratio: 91%
- Number of berries per shoot: 137%
- Berry size: 88%
- Yield (g) per healthy shoot: 122%



2012: Compared to open air condition (100%), in the Walk-in tunnel conditions:

- Winter injury of apical buds: 36% (9% vs. 26%)
- Winter injury of shoots: 40% (8% vs. 19%)
- Yield (g) per bush: 215%

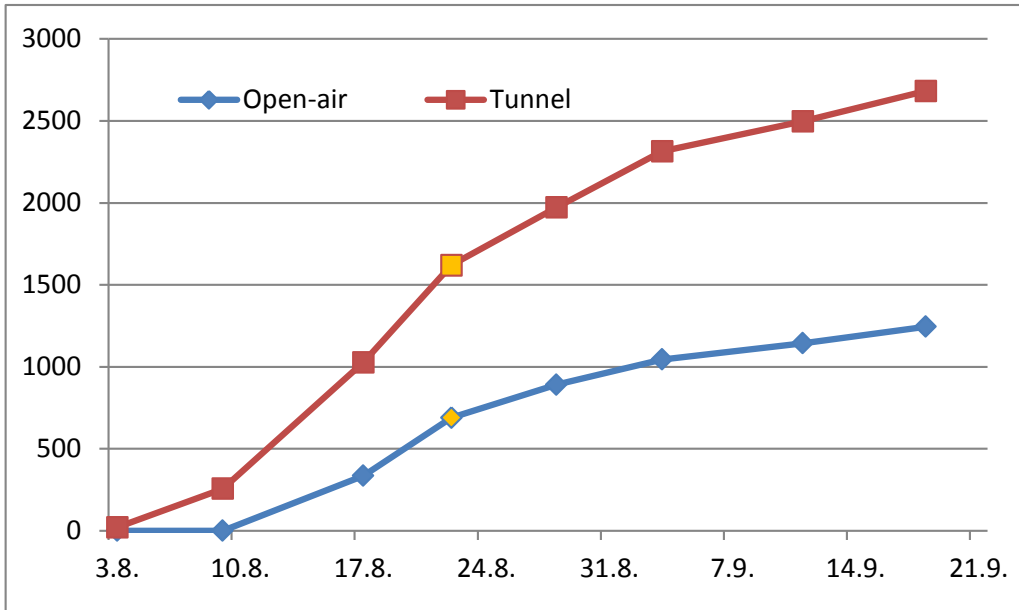


2013: Compared to open air condition (100%), in the Walk-in tunnel conditions:

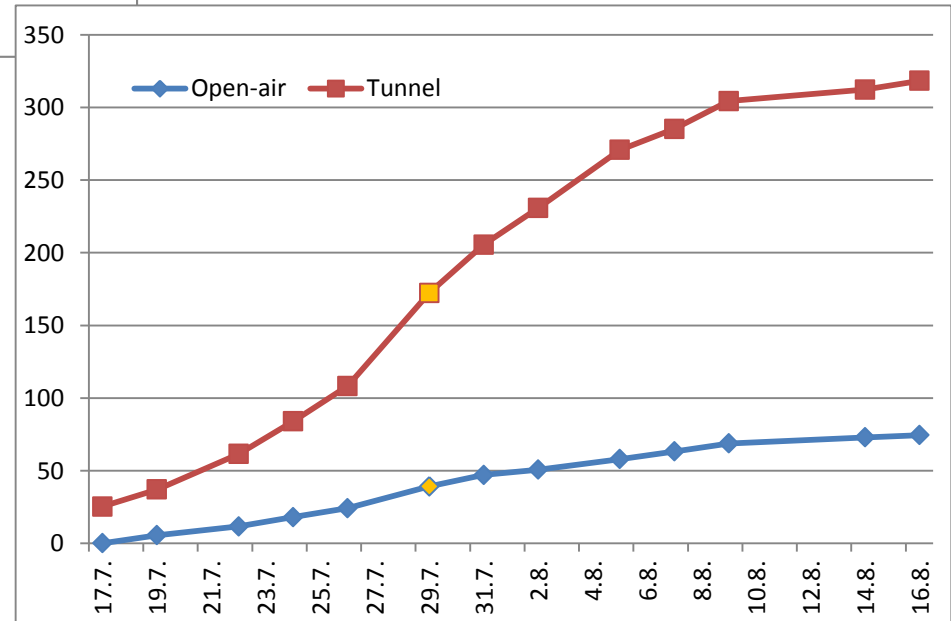
- Winter injury of apical parts of shoots: 44% (41% vs. 94%)
- Winter injury of proximal parts of shoots: 81% (33% vs. 41%)
- Yield (g) per bush: 427%



Cumulative yield g/plant in 2012

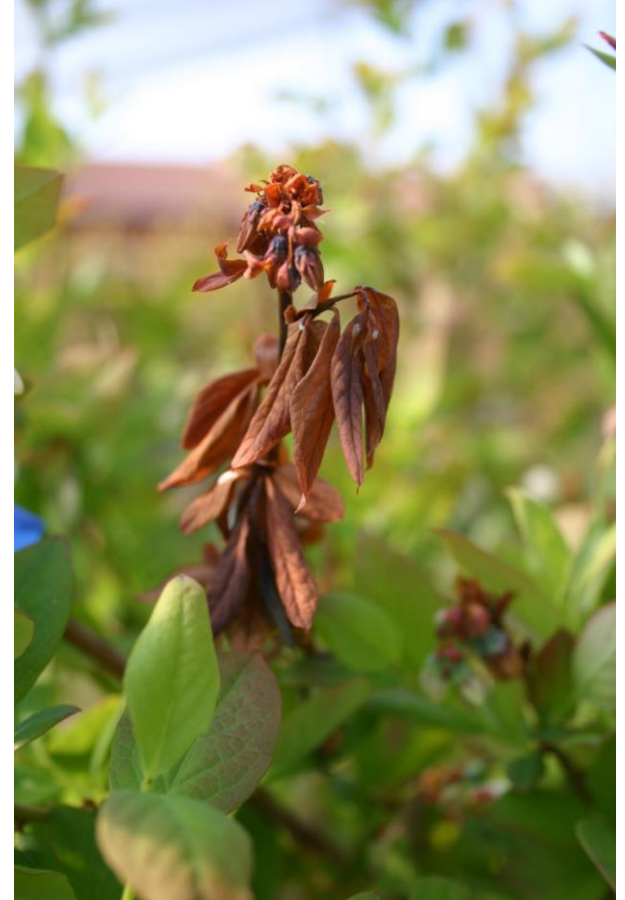


Cumulative yield g/plant in 2013



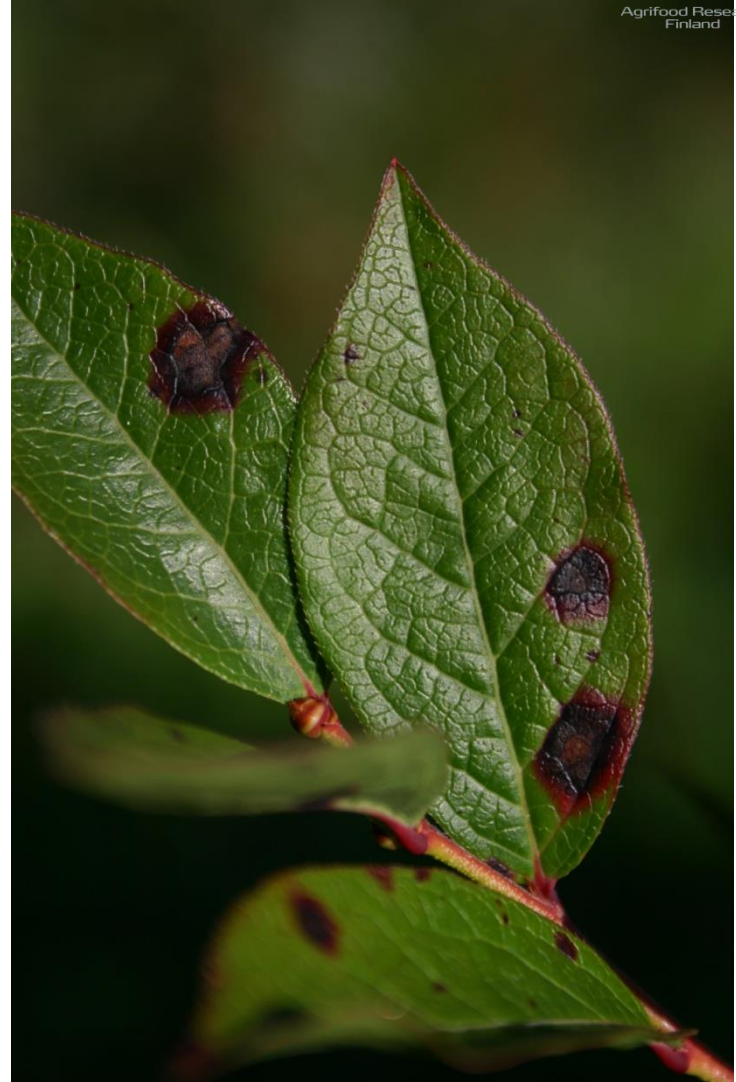
Diseases and pests

Grey mold found in both conditions
- No big difference



Next steps

- Analyse yield quality: Brix, titratable acids, anthocyanins, vitamin C
- Relate the fenological steps to Effective Temperature Sums (DD5), to daily minimum and maximum temperatures
- Continue observations of possible pests and diseases, studies of flower initiation?



Conclusions

Elongated growing period (higher temperature)

- Increases number of flowers
- Improves winter hardiness
- Increase productivity
- Has no harmful effects on high-bush blueberry in high latitude conditions

