CULTIVATION RESEARCH IN NORWAY

Inger Martinussen – Bioforsk Nord Tromsø
Seminar Ranua – august 2011




Cloudberry – *Rubus chamaemorus*

European blueberry – *Vaccinium myrtillus*

Crowberry – *Empetrum nigrum*

Lingonberry - *Vaccinium vitis-idaea*

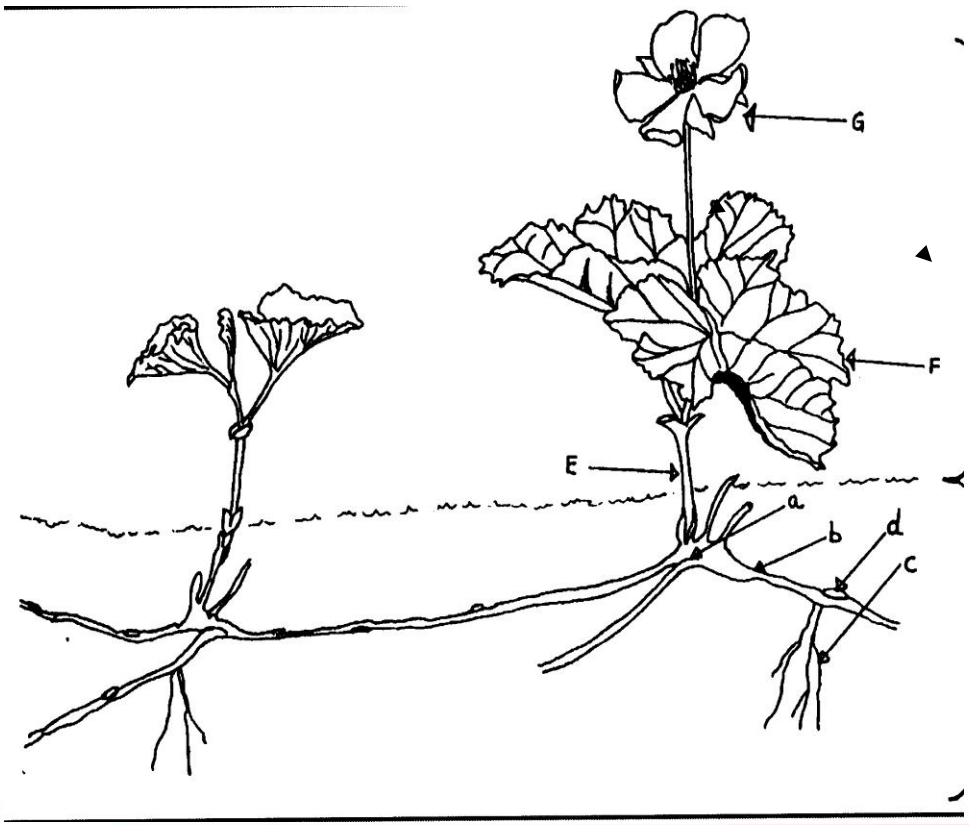
Increasing market for wild berries

- Increased focus on health and well-being
- Increased focus on local food and traditions → Nordic kitchen the new trend-kitchen?
- Increased focus on origin of the food
- Increased focus on quality
- Increased focus on spare time, holidays and activities → we want something exotic

Challenges – how to make profit?

- Cost of working hours is high
- Harvesting – price of raw material
- Price of product – how much are the consumer willing to pay?
- High price $\Rightarrow$ high quality
- Excess roads
- Terrain
- Cost of transport
- Extraction of compounds – berries in cosmetics, neutraceuticals, natural coloring etc.

Cloudberry plant



Annual parts

- Flower
- Stem
- Leaves

Perennial part

- Root-stem
- Rhizome
- Roots
- Resting buds

Limiting factors for cloudberry production

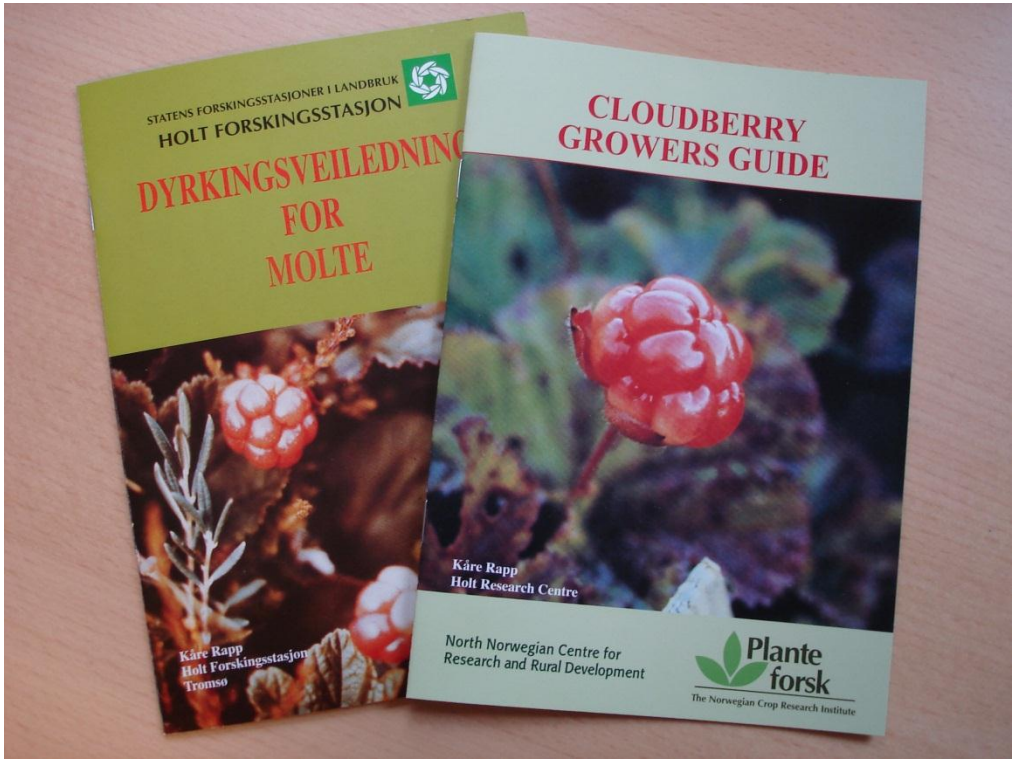
- Number of females
- Optimal ratio between males and females
- Good genotypes of both sexes
- Insects for pollination
- Weather during flowering, pollination and ripening
- Harvest - picking

Cultivation of cloudberry

- Breeding
- Propagation
- Ratio between male and females
- Establish cultivated fields
- Soil cultivation and fertilization
- Bumble bees for increased pollination
- Frost protection, wind breaks
- Use of horticultural fleece
- Planting machinery
- Flowering
- Fruit development
- Quality – effect of climate and genetics

Cloudberry growers guide

- Picking instructions – divide in quality groups
- Analysis of raw-material and products
- Product development
- Guide for greenhouse production

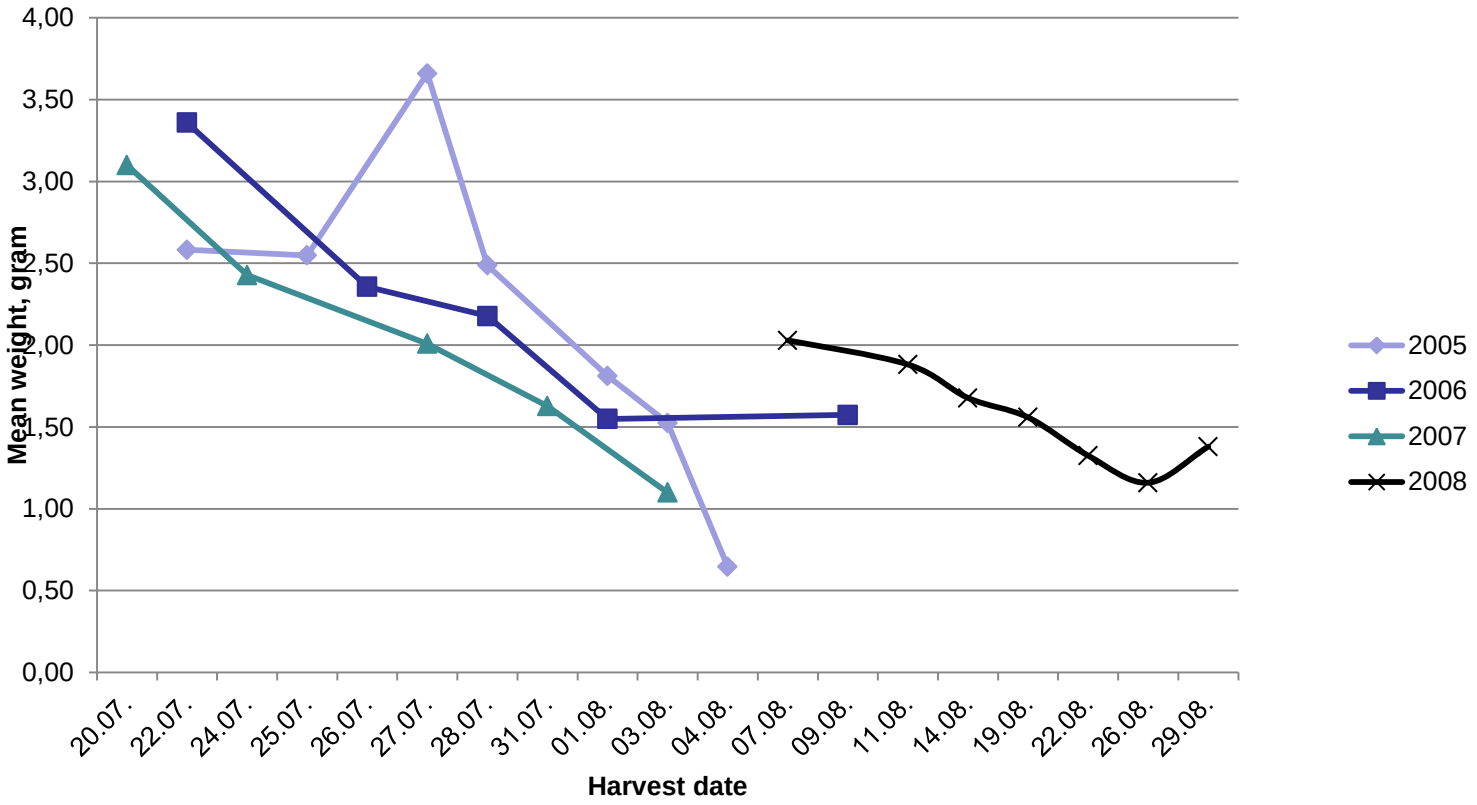


Clone evaluations at Bioforsk Nord

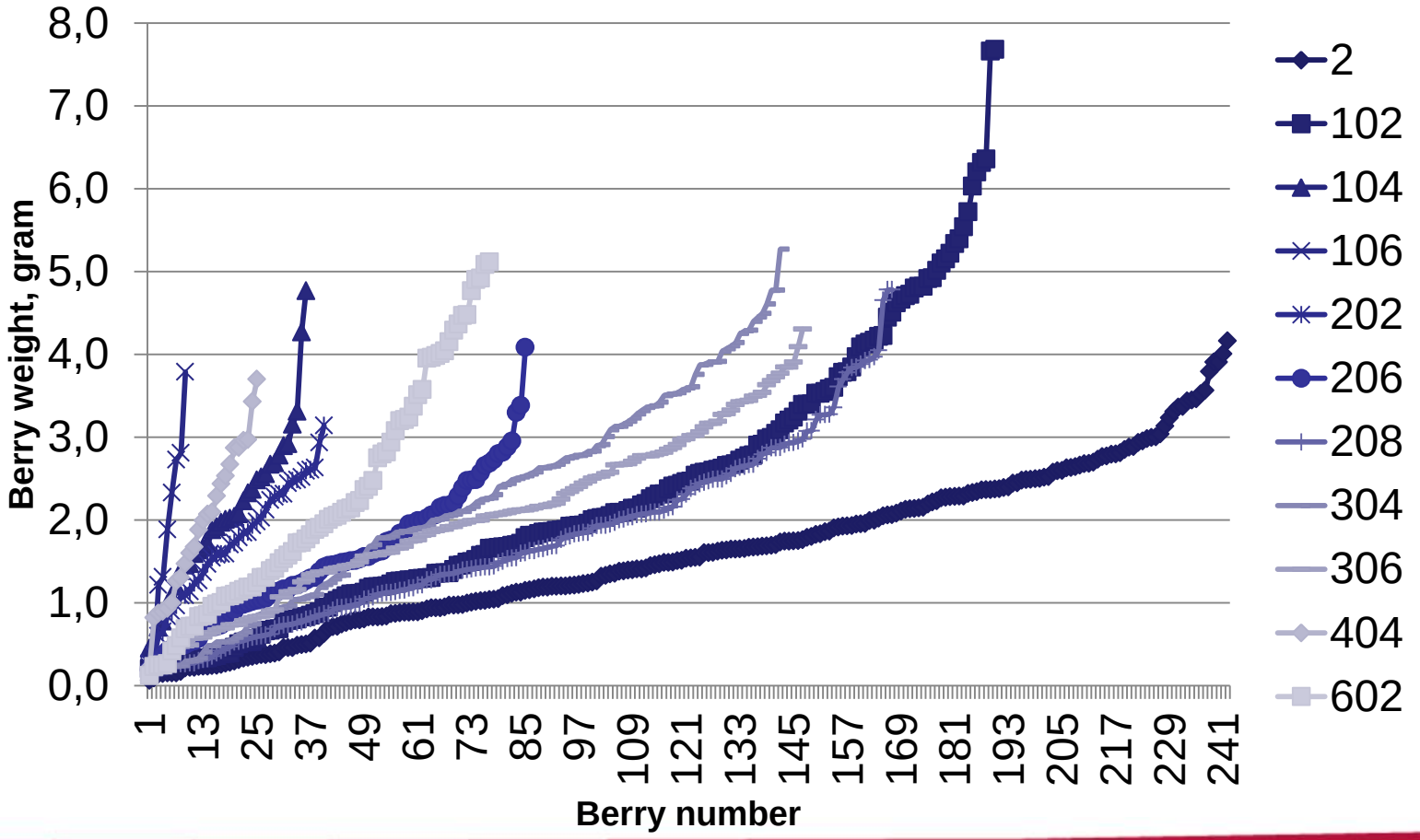
- Selection criteria
  - Number of pistils or stamens per flower
  - Number of flowers
  - Number of shoots per m^2
- Released cultivars
  - Two female; ‘Fjellgull’ and ‘Fjordgull’
  - Two male; ‘Apollen’ and ‘Apolto’

‘Fjellgull’

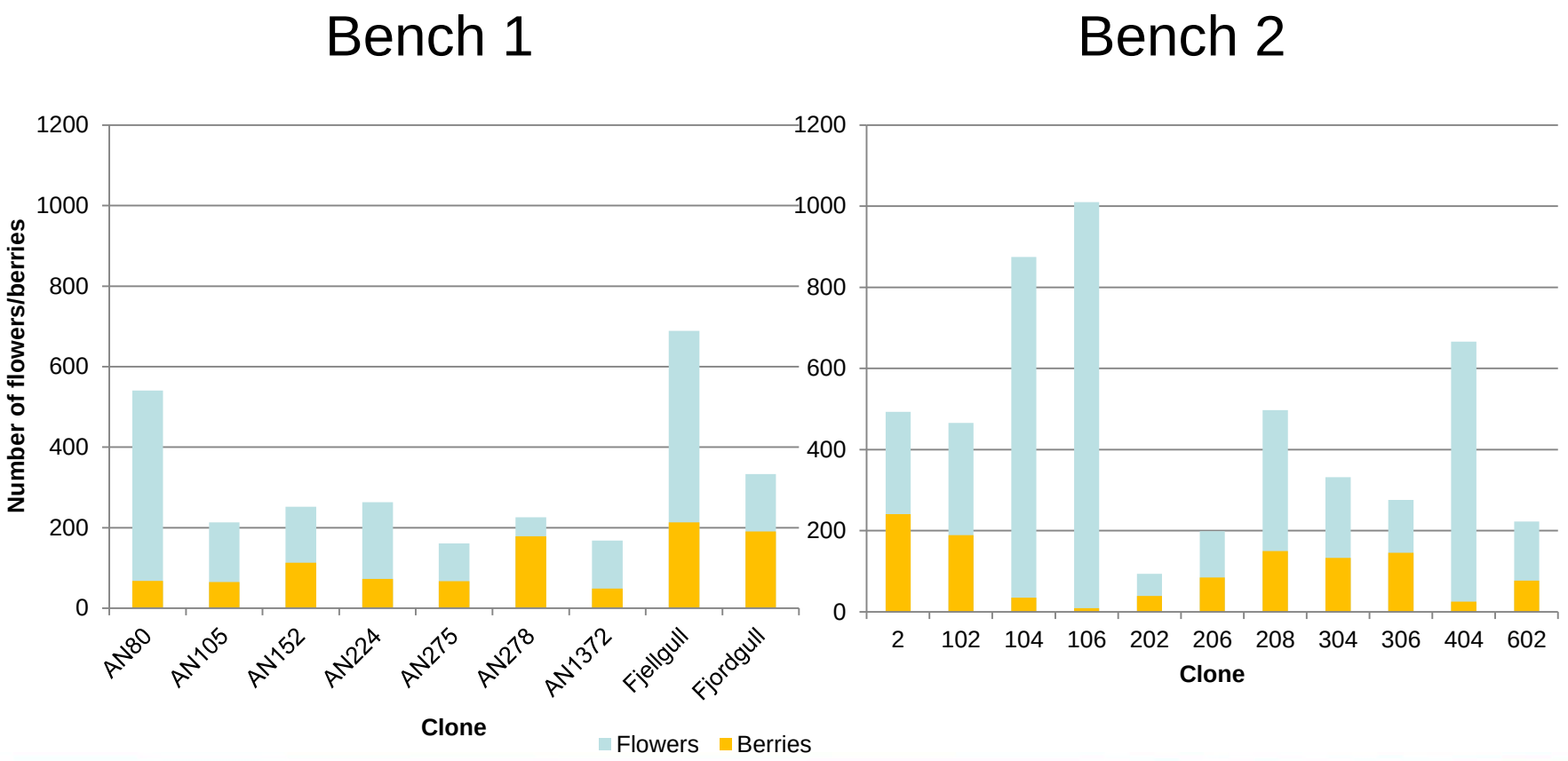
Mean berry weights as affected by harvesting time



Individual berry weights 2005-2008 – Bench 2



Number of flowers and berries 2006 -2008



Estimated broad sense heritabilities

Trait	Number of flowers	Number of pistils	Berry size	Drupes per berry	Number of berries
Heritability	0.86	0.85	0.25	0.18	0.28



Cultivation approaches – from the growers guide

1. Fertilization
2. Soil cultivation
   Fertilization
3. Planting
   Soil cultivation
   Fertilization

Acid soil (pH 3,5 – 4,5)

Soil with air/*Sphagnum* peat H2-H4

Humidity

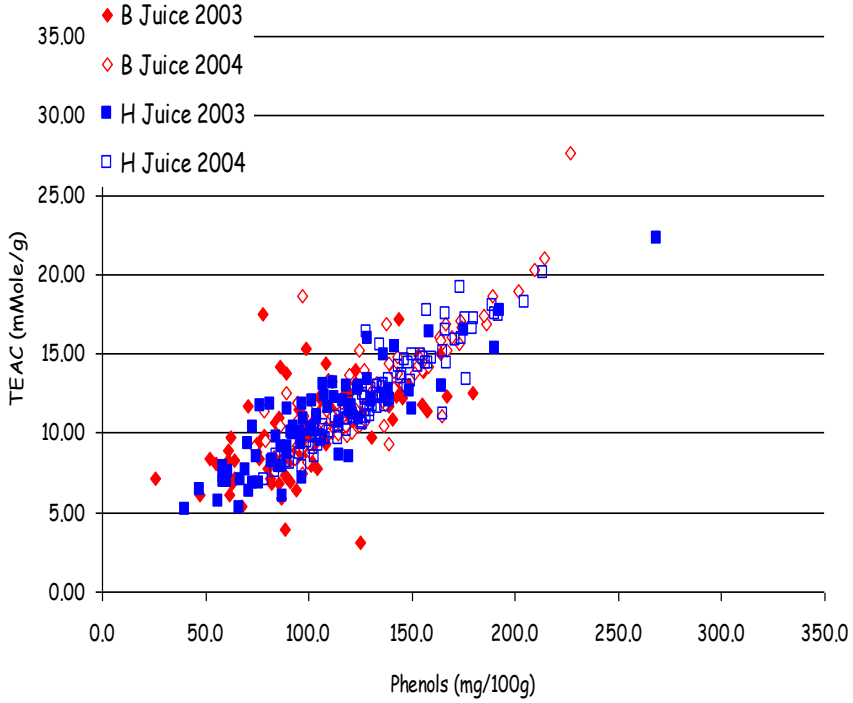
Pollination

Pollination %	Males 7,5 %	Males 15 %	Bees 30	Bees 50
Fjellgull	43	68	43	74

Metabolic Profiling of *Rubus* - Cloudberry and Raspberry

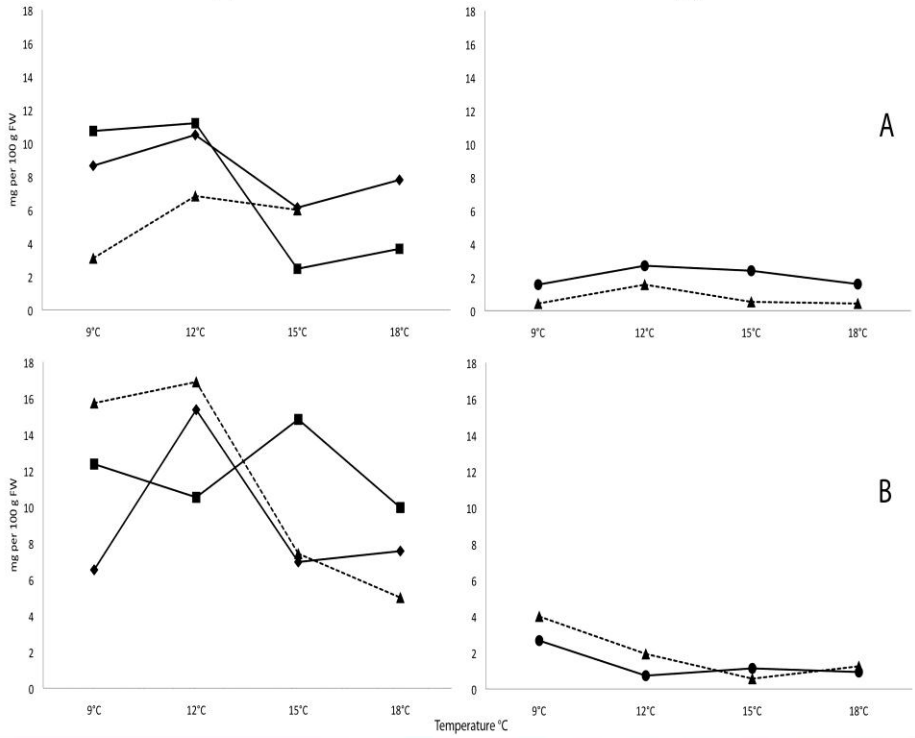
- Project owner Graminor AS
- Project leader Bioforsk Nord
- Study the inheritance, and the environmental stability, of important phytochemicals → polyphenols
- Breeding of nutritionally enhanced *Rubus* crops

Antioxidant activity strongly related to polyphenol content




Fjellgull


Nyby



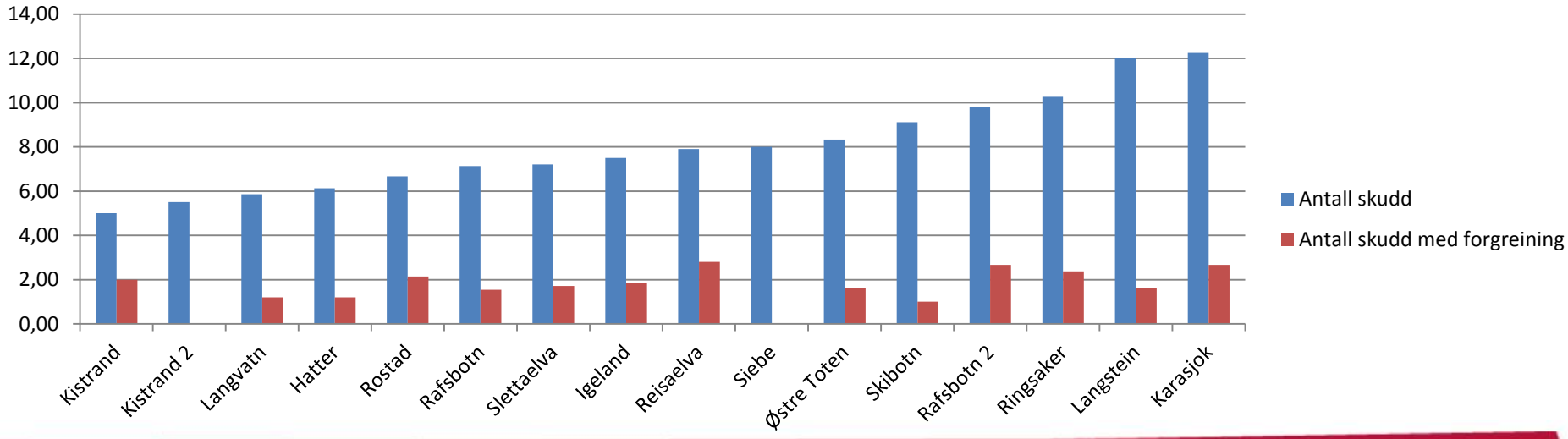
Cultivation of European blueberry (*Vaccinium myrtillus*)

Established fields – north/mid/south Norway

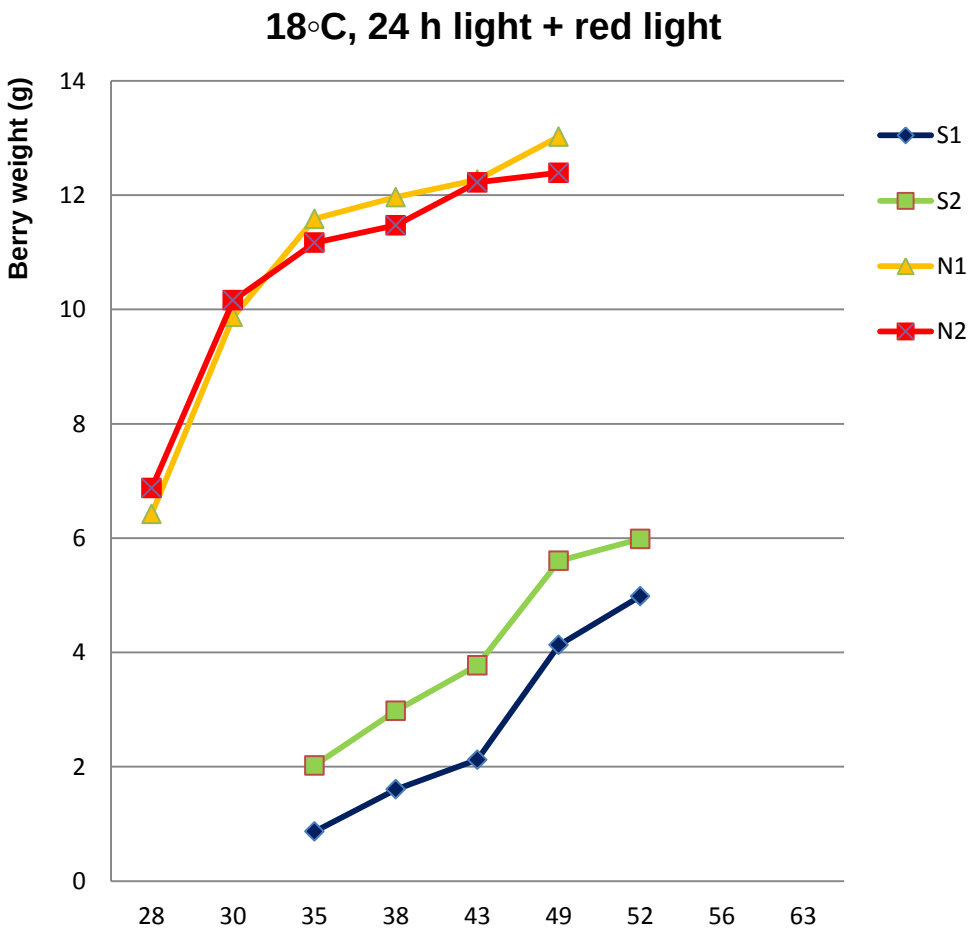
- Soil analysis
- Climate
- Vegetation mapping
- Fertilization
- Cutting
- Quality of berries

Collection of seedlings - breeding

Big variation in growth between populations



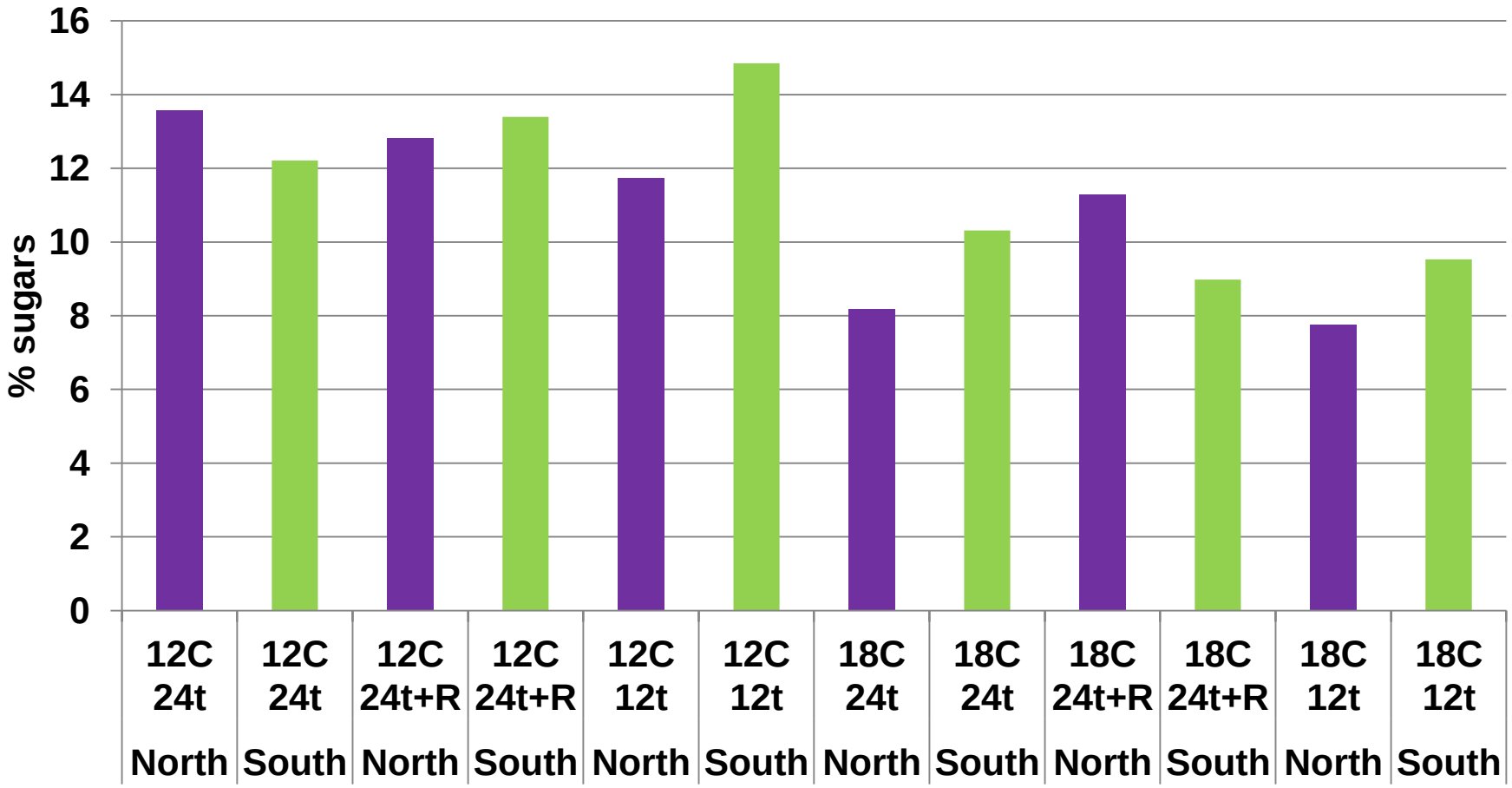
Different adaptation to day lengths



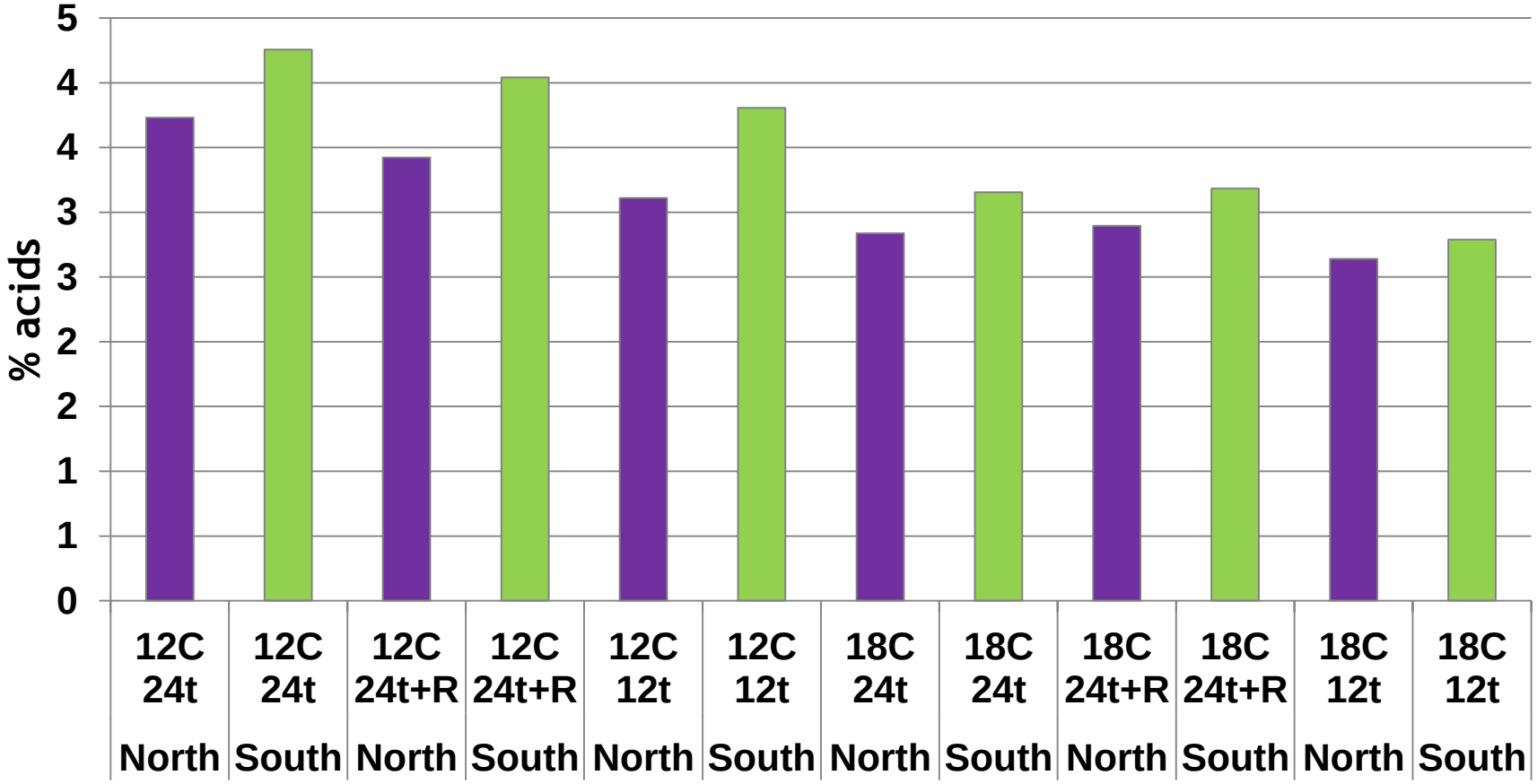
Northern plants produce berries earlier at northern light conditions than plants from the south

Berries are sweeter at low temperature

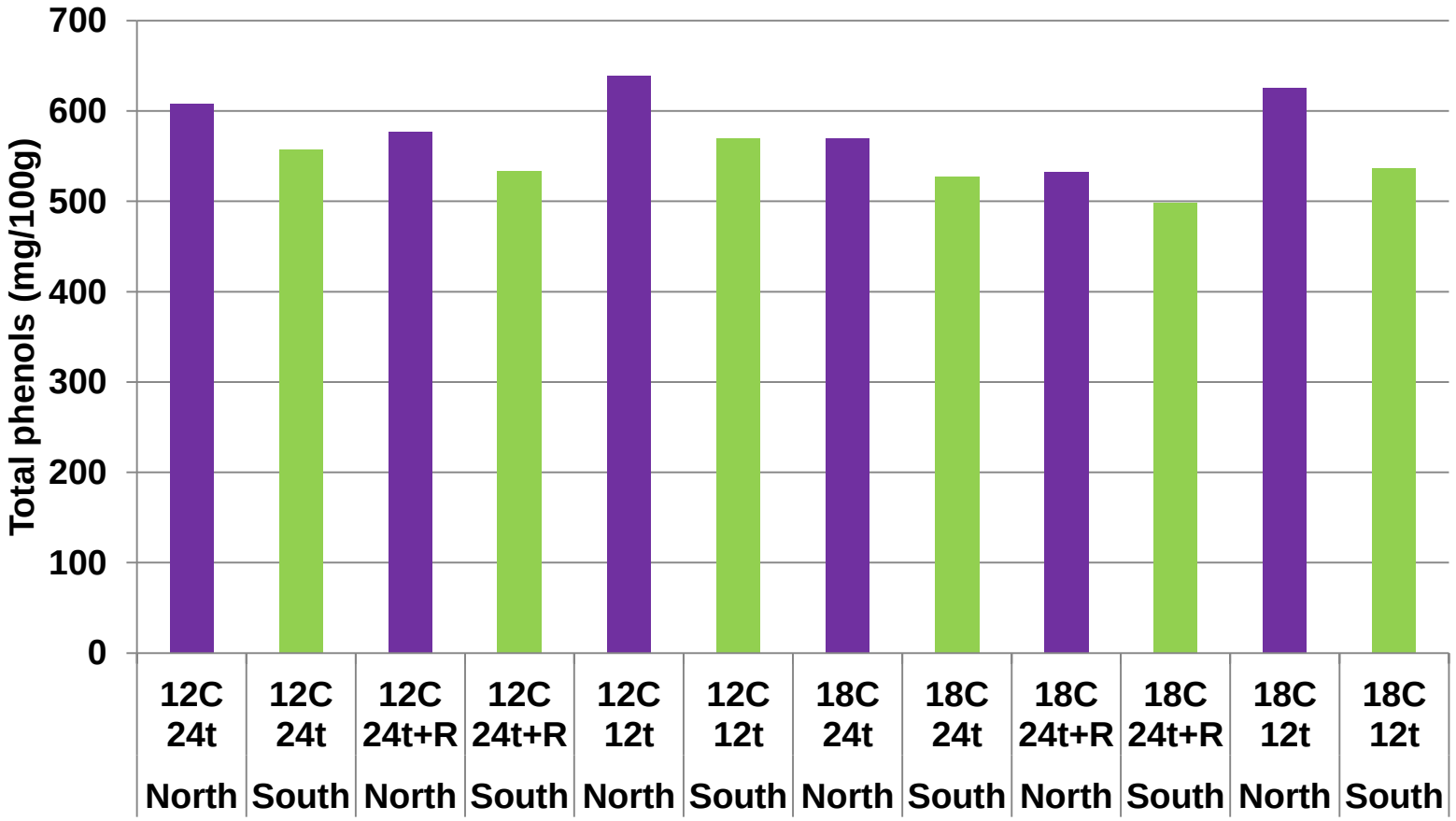
(P=0.000 for clone and temp)



Higher content of acids at low temperature (P=0.000 for clone and temp, P=0.011 for light)



Total phenolic content higher in Northern clones (P=0.001)



Thank you!