Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

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An update on black currant breeding in Sweden

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Future-proofing berryfruit CLIMAFRUIT

The Interreg IVB North Sea Region Programme
Investing in the future by working together for a sustainable and competitive region

Background

- Public breeding of black currant restarted in 2009 based on a research project from 2006 and previous breeding efforts from approx. 1970.
- The breeding programme is aimed at developing cultivars primarily for organic black currant growing
- Sponsored by the Swedish Research Council Formas, and the Swedish University of Agricultural Sciences.
- Budget: approx. 550 000 SEK a year
- Plants are grown in the north and in the south of Sweden – aiming at 2000 plants every second year.

Transnational cooperation on spatial development 2007 - 2013 (INTERREG IV B)

Breeding populations at Balsgård Sept. 2013

Breeding objectives 1

Plant adaptation = annual and high yield

Cold tolerance (winter and spring frosts)
Early ripening (in the north = middle of August)
Late ripening (in the south = end of August)

'BRi 9508-3A' has low susceptibility to gall mite, tasty fruits, healthy foliage, early ripening (will be marketed in 2014).

Late selection, photo sept 2012 (at Balsgård)

Breeding objectives 2

Pest and disease resistance/tolerance
Powdery mildew (*Sphaerotheca mors-uvae*)
White pine blister rust (*Cronartium ribicola*)
Septoria leaf spot (*Mycosphaerella ribis*)
Black currant leaf spot, anthracnose (*Drepanopeziza ribis*)

Black currant gall mite (*Cecidophyopsis ribis*)
Black currant reversion virus (BRV)
Black currant leaf curling midge (*Dasyneura tetensi*)

= a healthy leaf foliage when grown organic

Breeding objectives 3

Plant growth

Upright but not completely erect plants – to allow regrowth from the inner of the plant and to allow efficient mechanical side pruning

Not too dense plants – to allow light and wind to penetrate the canopy

Not too dwarf plants – to fit poor soils and management systems with less nitrogen supply

Pliable branches – not to be damaged by machine harvesting or heavy wind

Breeding objectives 4

Strig and fruit quality
Machine harvesting and harvesting by hand for fresh market/home gardens – different berry size, skin firmness and strig quality specifications! Not too dense clusters – both short and long strigs are ok.

Dry pick berries that don't drop too easily or deteriorate at full maturity.

Sweet berries much wanted for fresh market and homegardens – high brix, low total acidity! Must have a pleasant but not too strong pure black currant taste!

Ascorbic acid, total phenols, anthocyanins – presently we take what we get although long term breeding aims at increased levels.

Breeding strategies

Plant material used
Cultivars and selections with local adaptation to the different climates in the north and south (eg. ‘Hildur’, ‘Titania’, ‘Intercontinental’)
Modern cultivars and selections with interesting traits (eg JHI cultivars, Baltic plant material).

Hybridisation
In greenhouse. Every second year. 2000–4000 seedlings.

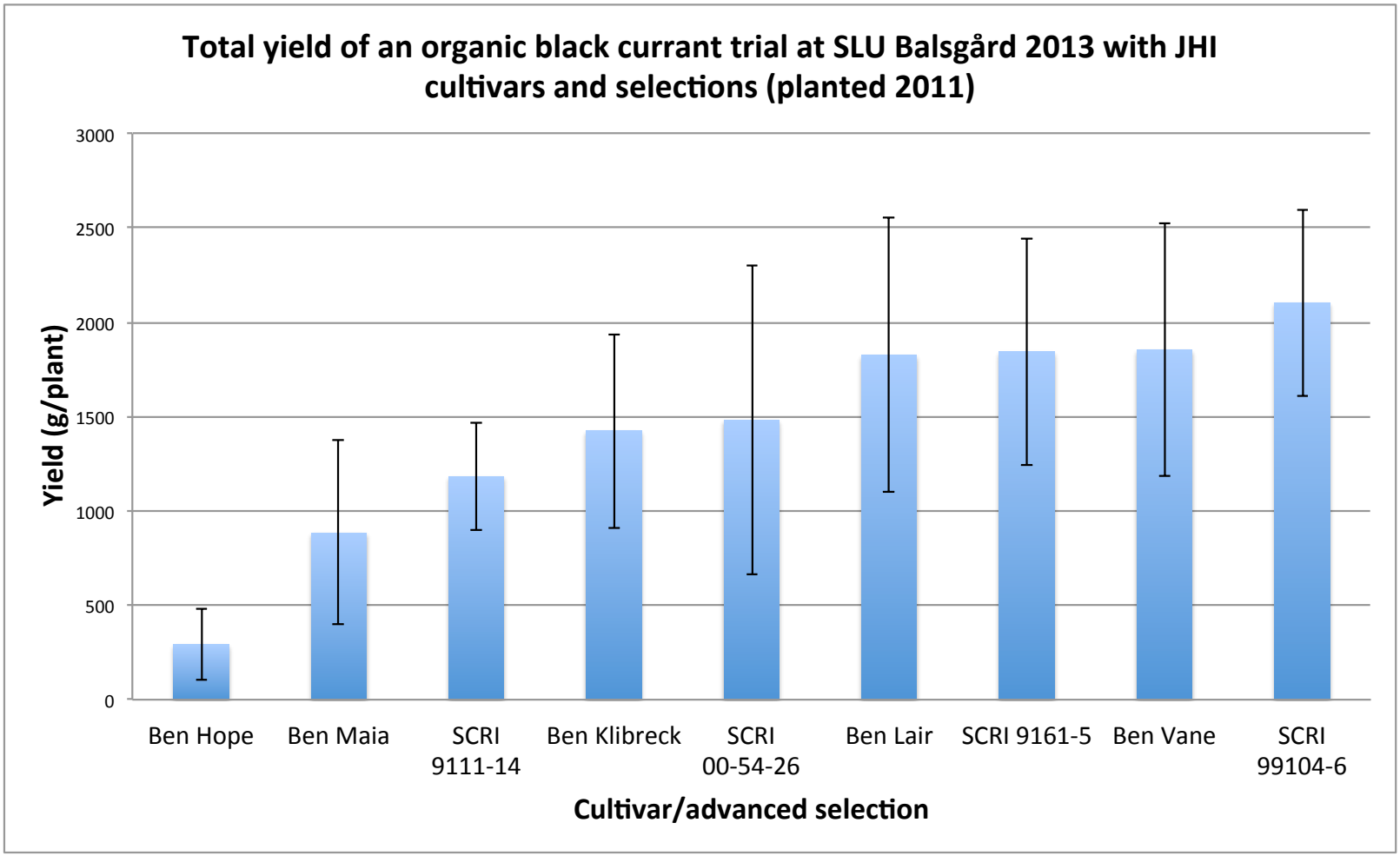
Seedlings
First months in pots indoors then outdoors.
Approx. 1000-2000 seedlings planted in the field during late autumn, and plants are now pruned to promote branching.

Breeding strategies cont.

Selection and comparative trials

Plants susceptible to mildew and week plants are discarded in the greenhouse. Selection in the field takes place from the third year when plant and fruit quality traits are considered, and plants are then propagated for comparative field trials!

Results: Cultivar trial

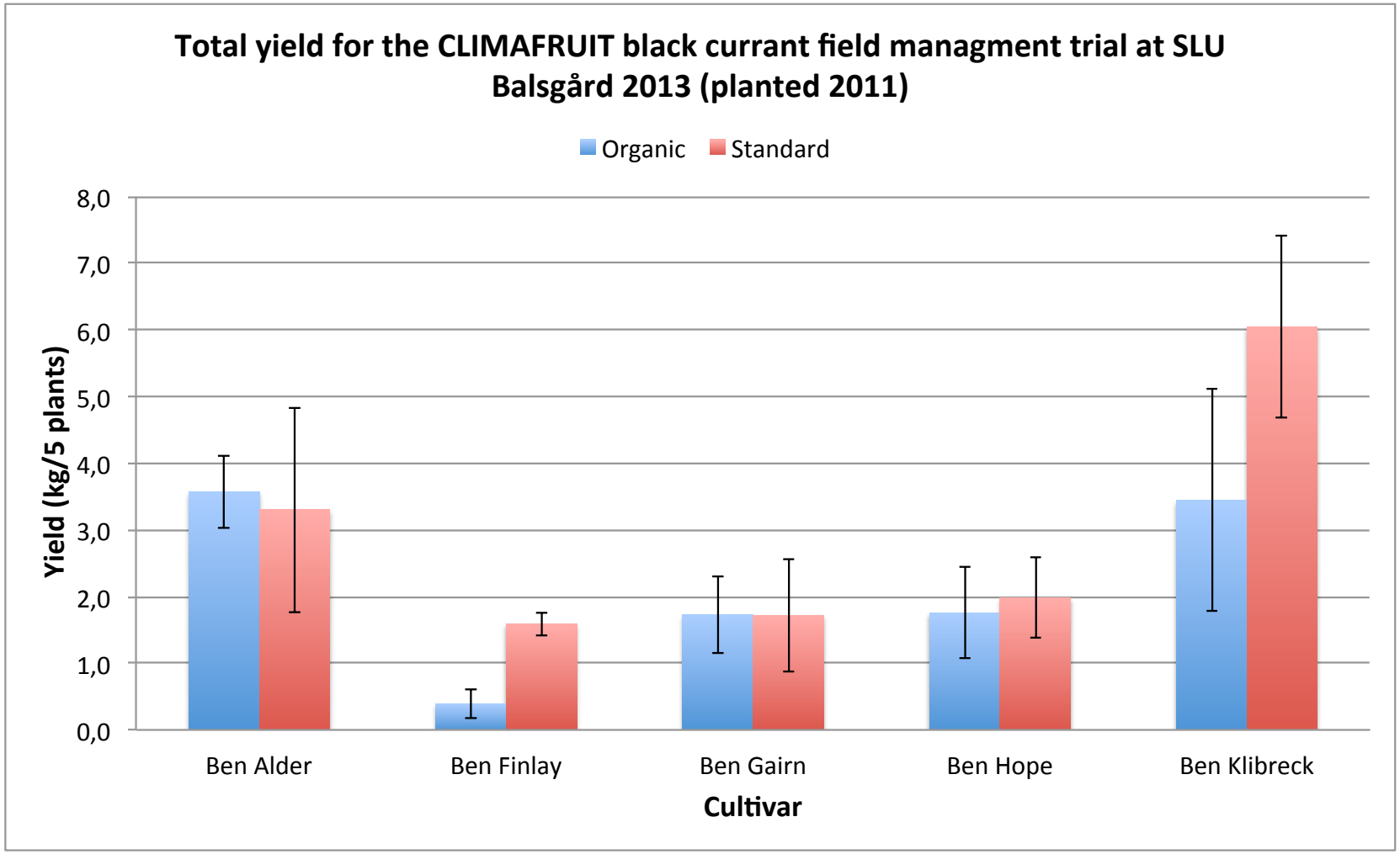


Cultivar trial results: large differences in ripening

Cultivar	Date of picking
Ben Maia	20130722
Ben Vane	20130722
SCRI 9111-14	20130723
Ben Hope	20130731
Ben Lair	20130802
SCRI 9161-5	20130802
SCRI 99104-6	20130814
Ben Klibreck	20130815
SCRI 00-54-26	20130819

‘Ben Lair’ – very easy to pick

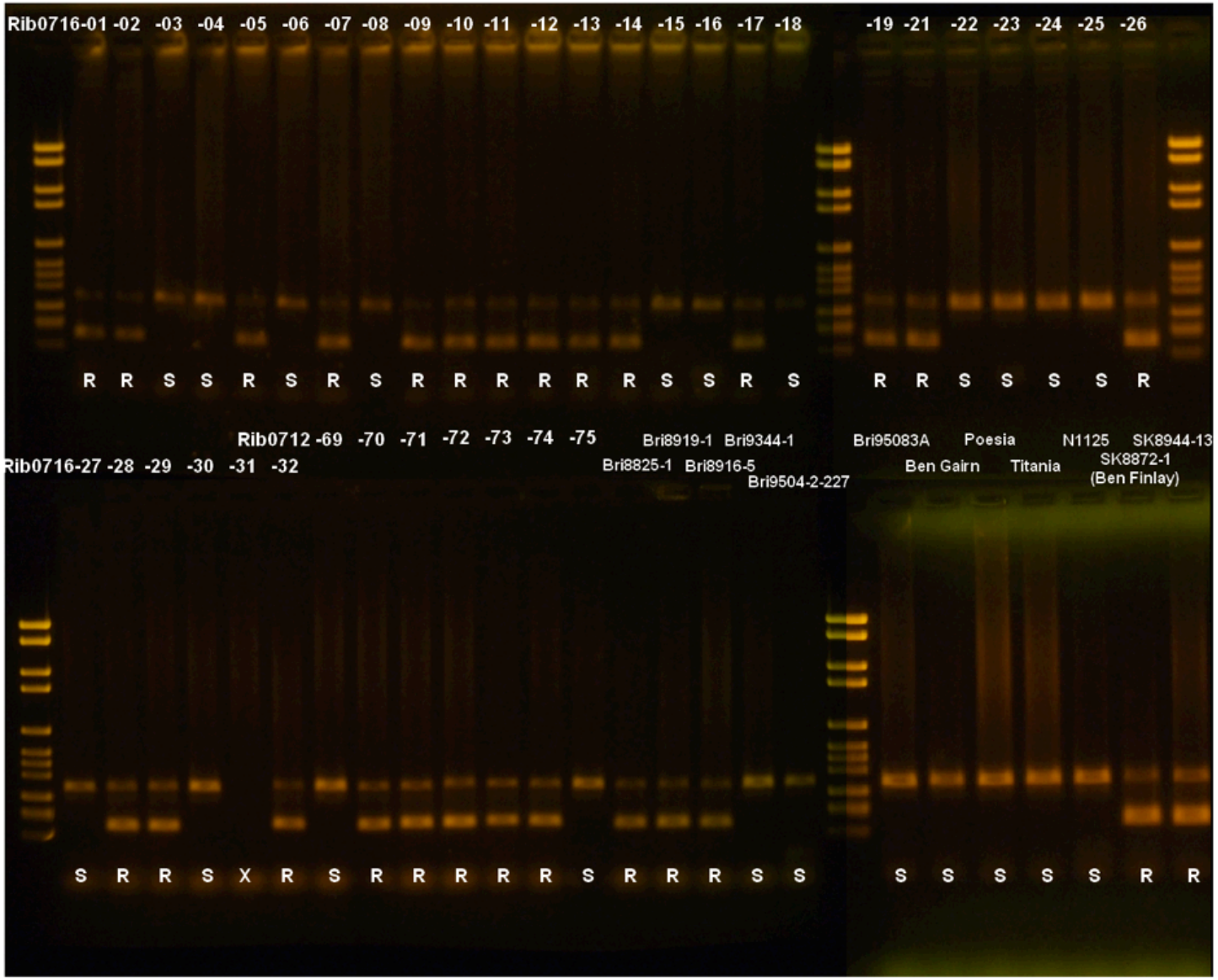
Regional (Climafruit) trial



Molecular marker protocol for Ce-gene tested

- Molecular marker system for gall mite resistance (Ce-gene) set up (thanks to support from several researchers at JHI)
- Big initial problems!
- The water quality seemed to be crucial!
- The protocol has been slightly optimized.
- Three populations (38 plants) and 12 cultivars/advanced selections tested.
- Resistant germplasm with marker for Ce-gene revealed.
- Money needed for future screening of breeding populations and core collections.

Reference: Identification of black currant (*Ribes nigrum* L.) plants with gall mite (*Cecidophyopsis ribis*) resistance using a PCR marker linked to the Ce-gene. 2012. Bachelor degree project in molecular biology, Molly Blendberg, Lunds University


Rib0716-01 -02 -03 -04 -05 -06 -07 -08 -09 -10 -11 -12 -13 -14 -15 -16 -17 -18
-19 -21 -22 -23 -24 -25 -26
R R S S R S R S R R R R R R S S R S
R R S S S S R
Rib0712 -69 -70 -71 -72 -73 -74 -75
Bri8919-1 Bri9344-1
Bri95083A Poesia N1125 SK8944-13
Rib0716-27 -28 -29 -30 -31 -32
Bri8825-1 Bri8916-5
Ben Gairn Titania
SK8872-1
(Ben Finlay)
Bri9504-2-227
S R R S X R S R R R R R S R R R S S
S S S S S R R

Benefits of the climafruit project

- Extended network (new contacts and competences) among black currant researchers
- Coordinated evaluation of identical plant material in different climates
- Access to novel plant material for testing
- Access to competences, facilities and protocols for different berry analyses (ex. polyphenols and molecular markers in cooperation with JHI)
- Increased focus on black currant R&D

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Welcome to visit Balsgård!

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