

## Scanning report (EIP format for practice abstracts)

**\*Project title (native language):** EU FRUIT europæisk netværk

**\*Project title (English):** EUFRUIT: European Fruit Network

**\*Author/native language editor:** Senior scientist, Martin Jensen, Department of Food Science, Aarhus University, Kirstinebjergvej 10, 5792 Aarslev, Denmark. Email: Martin.Jensen@food.au.dk , phone: +45 87158331.

### Section A. Summary for EIP dissemination

**\*Keywords:** EUFRUIT, innovations, disseminations, breeding and cultivar trials in softfruits, organic trials, minor crops, blackberry in tunnel, black and red currant, Aronia, bilberries, new specialty crops, machine harvest.

**\*Main geographical location:** [DK011 (Copenhagen), DK012 (Copenhagen and its environs), DK013 (North Zealand), DK014 (Bornholm), DK021 (East Zealand), DK022 (West- and South Zealand), DK031 (Funen), DK032 (South Jutland), DK041 (West Jutland), DK042 (East Jutland), DK050 (North Jutland)]

**Other geographical locations:** None

#### \*Summary (native language):

Sortsforsøg med *soft fruit* eller *small fruit* arter inklusiv specialsorter og -arter rapporteres. Resultater for brombær (økologisk), solbær og ribs til industri (økologiske eller konventionel), Aronia melanocarpa, en række nye buske og træer beregnet til maskinhøst med ny portalhøster og domesticeringsprojekter for *Vaccinium myrtillus* (almindelig blåbær) blev afrapporteret, enten ud fra igangværende forsøg med foreløbige resultater eller fra nyligt afsluttede forsøg. I økologisk brombær produktion i sommerdækkede tunneller var Loch Ness, Loch Tay og Natchez mest lovende. I igangværende økologiske solbærforsøg med standard anbefalede sorter (Ben Hope, Ben Lomond, Ben Tirran, Narve Viking) og nogle nye forædlingskloner fra JHI (Scotland) viste det sig at en af de nye test kloner blomstrede meget sent og undslap sen forårsfrost i alle år og gav det højeste akkumulerede udbytte. Narve Viking, Ben Hope, Ben Lomond var de bedste sorter. I ribs dyrket økologisk viste Red Poll og Roodneus sig at give det højeste udbytte og også det højeste farveindhold, bedre end Augustus og Rovada.

For Aronia melanocarpa gav Viking lidt højere udbytte end Nero I økologisk forsøg. Anthocyanin koncentrationen i presseresten var afhængig af juice processeringsmetoder og pressemetoder og over 50% af anthocyaninerne var tilbage i presseresten efter presning. Sammenlignende klonforsøg med over 100 kloner af almindelig blåbær viste stor variation i udbytte, bærestørrelse, plantevækst, plantesundhed og frugt kvalitet. Effektive formerings og dyrknings metoder med urteagtige sommer stiklinger er udviklet og en specialtilpasset flydende gødningsopløsning er udviklet for almindelig blåbær. Data for selektion af de bedste kloner indsamles for flere år og det forventes at nye sorter kan udsendes snart.

36 sorter af 12 forskellige nye specialarter/sorter testes I DANBÆR projektet, bl.a. hascabs, amerikansk blåbær, busk kirsebær, saskatoons, goji bær, sølvblad, kirsebærkornel, hvidfrugtet ribs, grønne solbær, jostabær og stikkelsbær. Planter blev etableret i 2016/2017 og første høst med nye portal høster blev gennemført med succes i sommer-efterår 2017.

#### Summary (english):

Cultivar trials with soft fruit and small fruit species including specialty crops were reported. Results for blackberry (organic), black and red currants mainly for industry (organic and or conventional), Aronia melanocarpa, a range of new bush and tree species for machine harvest and the domestication process for *Vaccinium myrtillus* (European blueberry) were reported, either ongoing with preliminary results or from recent finished trials. In blackberry organic production in summer-covered tunnels Loch Ness, Loch Tay and Natchez were most promising. In black currant ongoing tests with standard recommended reference cultivars (Ben Hope, Ben Lomond, Ben Tirran, Narve Viking) and some new breeding clones from JHI (Scotland) in an organic trial showed that

a new test clone was late flowering and escaped spring frost in all years and gave the highest accumulated yield. Narve Viking, Ben Hope, Ben Lomond is the best cultivars in conventional tests. In red currant an organic trial showed that Red Poll and Roodneus had the highest yields and the highest content of color and were recommended, and better than Augustus and Rovada.

For Aronia melanocarpa Viking showed a bit higher yield than Nero in an organic trial but both had very high color content. Anthocyanin content in pomace varied depending on juice processing and pressing methods and more than 50% of anthocyanins were left in the pomace. Common garden trials with over 100 clones of European blueberries showed large variation in yield, berry size, plant growth, plant health and fruit quality. Efficient propagation methods using summer cuttings were developed and a special liquid fertilizer developed for EB. Data for selection of superior cultivars has been collected for several years and is expected to lead to release of clones in few years.

36 cultivars of 12 different new specialty species/cultivars is being tested in the DANBERRY project, i.e. hascaps, highbush blueberries, bush cherries, saskatoons, goji berries, japanese silver berries, cornelian cherries, hascaps, white (red) currant, green (black) currant, hybrid black currant x gooseberry, gooseberries. Plants were planted in 2016/2017 and first harvest with machine were done successfully in summer-autumn 2017 and fruit analysis performed for some varieties.

## Section B. Project information

**\*Project coordinator:** Michelle H. Williams; Aarhus University, Department of Food, Kirstinebjergvej 10, 5792 Aarslev, Denmark; mw@food.au.dk; +45 25170049

**\*Project period:** 2016 - 2019

**\*Project status:** Ongoing

**\*Funded by:** Horizon 2020

**\*Total budget:** €1.8m

**\*Geographical regions:** DK011 Copenhagen, DK012 Copenhagen and its environs, DK013 North Zealand, DK014 Bornholm, DK021 East Zealand, DK022 West- and South Zealand, DK031 Funen, DK032 South Jutland, DK041 West Jutland, DK042 East Jutland, DK050 North Jutland, BE211 (Arrondissement. Antwerpen), BE212 (Mechelen), BE213 (Turnhout), BE221 (Hasselt), BE222 (Arr. Maaseik), BE223 (Tongeren), BE231 (Aalst), BE232 (Dendermonde), BE233 (Eeklo), BE234 (Gent), BE235 (Oudenaarde), BE236 (Sint-Niklaas), BE241 (Halle-Vilvoorde), BE242 (Leuven), BE251 (Brugge), BE253 (Ieper), BE254 (Kortrijk), BE255 (Arr. Oostende), BE256 (Arr. Roeselare), BE257 (Tielt), BE258 (Veurne), BE310 (Nivelles-Nijvel), BE331 (Huy-Hoei), BE332 (Liège- Luik), BE334 (Wareme-Borgworm), BE335 (Verviers), FR8 Méditerranée; FR81 Languedoc-Roussillon, FR6 SUD-OUEST, FR512 Maine et Loire, FR611 Dordogne, FR812 Gard, DE6 (Hamburg), DE8 (Mecklenburg-Vorpommern), DE9 (Niedersachsen), DEF0 (Schleswig-Holstein), DEE0 (Sachsen-Anhalt), DEA (Nordrhein-Westfalen), DE111, DE112, DE113, DE114, DE115, DE116, DE117, DE118, DE119, E11A, DE11B, DE11C, DE11D, DE121, DE122, DE123, DE124, DE125, DE126, DE127, DE 128, DE129, DE12A, DE12B, DE12C, DE131, DE132, DE133, DE134, DE135, DE136, DE137, DE138, DE139, DE13A, DE141, DE142, DE143, DE144, DE145, DE146, DE147, DE148, DE149, DE600 Hamburg, DE932 Cuxhaven, DE933 Harburg, DE939 Stade, DEF09 Pinneberg, NL1-NL4 + NLZ Holland; NL 224 zuidwest Gelderland, NL 226 Arnhem/Nijmegen, NL230 Flevoland, NL310 Utrecht, NL321 Kop van Noord-Holland, NI322 Alkmaar en omgeving, NL338 oost Zuid-Holland, NL33A zuidoost Zuid-Holland, NL341 Zeeuws-Vlaanderen, NL342 overig Zeeland, NI411 west Noord-Brabant, NL413 noordoost Noord-Brabant, NL414 zuidoost Noord-Brabant, NL421 noord Limburg, NL422 Midden-Limburg, NL423 zuid Limburg, ES620 Murcia, UKG11 Herefordshire, UKG12, Worcestershire, UKH12 Cambridgeshire, UKH16 North and West Norfolk, UKH17 Breckland and South Norfolk, UKJ22 East Sussex, UKJ35 South Hampshire, UKJ36 Central Hampshire, UKJ37 North Hampshire, UKJ41 Medway, UKJ42 Kent, UKJ43 Kent Thames Gateway, UKJ44 East Kent, UKJ45 Mid Kent, UKJ46 West Kent, ES618 Sevilla, ES511 Barcelona, ES512 Gerona, ES513 Lérida, ES514 Tarragona, CH0 Schweiz/Suisse/Svizzera, ITH51-59 Emilia Romagna region, ITH10 Bolzano-Bozen, HU101 Budapest, HU102 Pest, RO111, RO112, RO113, RO114, RO115, RO121, RO122, RO123, RO124, RO125, RO126, RO211, RO212, RO213, RO214, RO215, RO216, RO221, RO222, RO223, RO224, RO225, RO226, RO311, RO312, RO313, RO314, RO315, RO316, RO317, RO321, RO322 RO411, RO412, RO413, RO414, RO415, RO421, RO422, RO423, RO424. HU101, HU102, LT001 Alytaus apskritis, LT002 Kauno apskritis, LT003 Klaipėdos apskritis, LT004 Marijampolės apskritis, LT005 Panevėžio apskritis, LT006 Šiaulių apskritis, LT007 Tauragės apskritis, LT008 Telšių apskritis, LT009 Utenos apskritis, LT00A Vilniaus apskritis.

**Project web page:** <http://www.eufrin.org/index.php?id=55>

**\*Project Objectives (native language):**

1. Etablering af Europæisk netværk med focus på frugt og bær sektoren
2. Udvikle og implementere en systematisk scanning og syntese af eksisterende videnskabelig og praktisk viden.
3. Etablere en fortløbende dialog med EU, nationale og regionale politiske styrelser
4. Identificere og bakke op om prioriterede forskningsområder ved fortsat monitoring og analyse af eksisterende og forskning- og innovationsaktiviteter på vej.

**Project Objectives (English):**

1. Establish a European network focused on the fruit sector.
2. Develop and implement a systematic approach for scanning and synthesizing existing scientific and practical knowledge.
3. Establish an ongoing dialogue with relevant EU, national and regional policy bodies.
4. Identify and support new priority areas of research by continually monitoring and analysing existing and upcoming research and innovation activities.

**\*Project partners:**

1. Aarhus University, Department of Food Science (Denmark) • AU
2. Research Station for Fruit npo (Belgium) • Pcfuit
3. Centre Technique Interprofessionnel des Fruits et Légumes (France) • CTIFL
4. Obstbauversuchsanstalt Jork (Germany) • OVA
5. Stichting Wageningen Research (Netherlands) • WR
6. ~~East Malling Research (United Kingdom) • EMR (terminated 08-02-2016)~~
7. Institut de Recerca i Tecnologia Agroalimentàries (Spain) • IRTA
8. Federal Department of Economic Affairs, Education and Research (EAER), acting through Agroscope Institute of Plant Sciences (Switzerland) • Agroscope
9. Laimburg Research Centre for Agriculture and Forestry (Italy) • Laimburg
10. University of Agronomic Sciences and Veterinary Medicine of Bucharest (Romania) • USAMV
11. National Agricultural Research and Innovation Centre Fruitculture Research Institute (Hungary) • NARIC
12. Lithuanian Research Centre for Agriculture and Forestry (Lithuania) • LRCAF
13. Assemblée des Régions Européennes Fruitières, Légumières et Horticoles (France) • AREFHL
14. Variety Innovation Consortium South Tyrol (Italy) • SKST
15. Freshfel Europe (Belgium) • FRESHFEL
16. Elbe-Obst Erzeugerorganisation r.V. (Germany) • EO
17. Fruitconsult BV (Netherlands) • FC
18. University of Greenwich (United Kingdom) • UoG
19. University of Hohenheim (Germany) • UHOH
20. Università di Bologna (Italy) • UNIBO
21. Institut National de la Recherche Agronomique (France) • INRA
22. NIAB EMR (new 09-02-2016)

**Section C. Annex: Scanning report<sup>1</sup>**

## Scanning report Martin Jensen, AU

**Author:** Senior scientist Martin Jensen, Aarhus University, Department of Food Science, martin.jensen@food.au.dk , +45 8715 8331

**Country:** Denmark

**NUTS 3 region(s)<sup>2</sup>:** [DK011 (Copenhagen), DK012 (Copenhagen and its environs), DK013 (North Zealand), DK014 (Bornholm), DK021 (East Zealand), DK022 (West- and South Zealand), DK031 (Funen), DK032 (South Jutland), DK041 (West Jutland), DK042 (East Jutland), DK050 (North Jutland)]

**WP no. and title:** WP2 Performance of new fruit varieties

**Date:** 25-04-2018

### Source materials and methodology

Information on small fruits and or soft fruits research including new species was gathered.

Blackberry experiment was performed by Martin Jensen as a part of the CLIMAFRUIT EU 2010-2013 project and updated with more recent information obtained from recordings in 2014. For black and red currant Hanne Lindhard Pedersen, consultant for the Horticultural Advice in Denmark and coworker at AU Årsløv, Aarhus University, Dept. Food Science contributed to the scanning with both ongoing experimental results and with results from previous trials in black and red currant. Information was included from an ongoing project DANBERRY (2014-2019), on testing of a large range of species and cultivars of newer niche crops/ some small fruits in how adapted they are to machine harvest with an over-the-row harvester (New Holland 9090 Dual). Domestication of European blueberries from Danish wild habitats was initiated in 2009 and two projects are finished now but the work is still ongoing in the third project in 2018. Research on Aronia melanocarpa has been done previously on cultivars and production aspects (2010-2012) and recently in an ongoing project (COLARO 2014-2018) on understanding color compounds and color yield in juice and pomace of Aronia. Scientific reports, popular magazine papers, thematic days presentations and open house events are included here as sources.

Jensen, M. 2017 Økologisk dyrkning af brombær i tunnel. (Organic cultivation of blackberries in tunnels). Gartnertidende, 6, 48-49.

Jensen, M. 2013 Cultivar performance of blackberries in Danish organic cultivation. Video on dissemination homepage of EU CLIMAFRUIT interreg project. Link [Cultivar performance of blackberries in Danish organic cultivation](#).

Jensen, M. 2013 Climafruit Blackberry trial – update September 2013. Oral presentation at Climafruit final meeting in Jork, Germany, 18 September 2013.

Jensen, M. Organic blackberries without thorns. Poster and oral communication at Food Festival 6 September 2013 in Tangkrogen Aarhus. (27-30.000 visitors)

Jensen, M. og de Pedro, S.F. 2017 Vilde blåbær – på vej mod ny dansk bærafgrøde. Gartnertidende, 10, 52-53.

Jensen, M. 2012, Nye muligheder med danske vilde blåbær. Gartnertidende, 5, 12-13.

Jensen, M. 2011. Danske vilde blåbær skal tæmmes. Frugt og Grønt, No 11/12, 470.

Jensen, M. 2014. Domestication of European blueberries. Video on dissemination homepage of EU CLIMAFRUIT interreg project. Link [Domestication of European blueberries](#)

<sup>1</sup> Equivalent to 'final report' in EIP-AGRI format.

<sup>2</sup> Please see ec.europa.eu/eurostat/ramon/nomenclatures/ for details on NUTS regions, level 3

Jensen, M. 2013 Aronia. Video on dissemination homepage of EU CLIMAFRUIT interreg project.

Jensen, M. (2013) Aronia – produktion af velsmagende og sundhedsbevarende bær. Slutrapport, pp. 1-22. 30. sept. 2013 (confidential)

Vagiri, M. and Jensen, M. 2017 Influence of juice processing factors on quality of black chokeberry pomace as a future resource for colour extraction. Food Chemistry, 217, 409–417. . <http://dx.doi.org/10.1016/j.foodchem.2016.08.121>

Lindhard Pedersen H. 2008. Juice quality and yield capacity of black currant cultivars in Denmark. 2008. Acta Horticulturae. vol. 777, 511-516.

Lindhard, H. & Andersen, L. 2012. Gode ribssorter. Økologisk nyhedsbrev 8, 16.

Lindhard Pedersen H. and Andersen L. 2012. Black and red currant cultivars for organic production. Proceedings of the 15th International Conference on organic Fruit-Growing. February 20th to February 22th at the University of Hohenheim, Germany. P 215-220.

Jensen, M. 2018 Soft fruit variety testing in Denmark. PPT and oral at EUFRUIT meeting, PCSierteelt, Belgium, 24-25 April 2018.04.27

Gitte H. Jørgensen, Hanne Lindhard. Nye bær til produktion i Danmark. Gartnertidende nr. 7, maj-2016.

Gitte H. Jørgensen. Stor interesse for haskap i Canada. Gartnertidende nr. 12, 2016.

Gitte H. Jørgensen. Surkirsebær kan også dyrkes som buske. Gartnertidende nr. 14, 2016.

Hanne Lindhard, Helle Mathiasen. Nye bærkulturer giver optimisme. Temadag GartneriRådgivningen 28-02-2017, UF5 <http://www.gartnertidende.dk/frugtbaer/nyheder/2017/nye-baerkulturer-giver-optimisme#.WOI0mE1MQRY>

Petersen m.fl. 2016. Danbær – Nye bær til produktion i Danmark. Poster Food Festival Århus 2. – 4. september 2016.

## Best practice findings

Trials with blackberry, black and red currants mainly for industry, Aronia, new species for machine harvest and the domestication process for *Vaccinium myrtillus* (European blueberry) were reported, both ongoing with preliminary results and recent finished trials. In blackberry organic production in summer-covered tunnels were investigated on 8 varieties. In black currant a number of trials were included in the scanning with many international cultivars and some new breeding clones from JHI (Scotland) both in an organic and conventional set up. In red currant results from an organic trial with red currant cultivars were included in the scanning report. New species being tested in the DANBERRY project included 36 cultivars of 12 different species. 2 wild plums (*Prunus domestica*, Mirabelle), 1 highbush blueberry (*V. corymbosum*), 4 bush sour cherries (*P. cerasus*), 2 saskatoons (*Amelanchier alnifolia*, serviceberries), 4 gojiberries (*Lycium barbarum*), 5 japanese silverberries (*Eleagnus umbellata*), 4 cornelian cherries (*Cornus mas*), 5 hascups (*Lonicera caerulea*, honeyberry), 2 white (red) currant, 2 green (black) currant, 1 hybrid black currant gooseberry, 4 gooseberries. Plants were planted in 2016/2017 and first harvest with machine were done in summer-autumn 2017 and fruit analysis performed for some varieties. Two projects with Aronia is reported briefly and three projects on European blueberries were included in this report with only brief inputs.

Blackberries of following varieties were tested: Loch Ness, Loch Tay, Karaka Black, Navaho, Natchez, Chester, Helen and Loch Marie. These were grown in a tunnel plastic house only covered in top to protect against rain from April to October. They were planted in 2010 directly in the ground with 1.5 m planting distance and 1.5 m row distance using mypex as cover against weeds. Dried chicken manure pills was used for fertilizer giving 80 kg N /ha/year. Drip irrigation was applied every day during cover period and biological control methods used against pest and diseases. In 2012 weekly and total yield was recorded together with berry weight, fruit quality, Brix, total acidity and total anthocyanins, disease attack on plants, frost hardiness, plant architectural aspects of flowering and flowering shoots. In 2014 the same planting was evaluated with same treatments but without plastic cover in the summer. Results showed that Loch Tay had the earliest harvest starting in week 29, followed by Natchez and Loch Ness. Navaho and Chester was the latest varieties giving fruit until mid October, with many fruits not getting ripe. Loch Ness had the longest

period of harvest of all varieties. Loch Marie and Karaka Black were intermediate in timing of harvest. The timing was about the same without the cover, but slightly later maturation for Navaho and Chester, with a lower total yield. The accumulated yield/plant in 2012 with cover was up to 12 kg fruit/plant in Chester and almost as much in Navaho, whereas Loch Tay gave almost 10 kg, Loch Ness slightly above 8 kg/plant and Natchez about 5 kg. Karaka Black and Helen did not do well, partly due to severe freeze back of shoots due to winter temperatures down to -24C. Loch Marie gave 4.4 kg/plant at same age after planting. In the 2014 recordings with no roof cover Loch Marie was performing quite well giving as much fruit as Loch Ness and Loch Tay.

Berry weight ranged from almost 10 g/berry in Natchez, to 8 g in Karaka Black, 7 g in Loch Ness, and about 6 g in Loch Tay, Navaho and Chester and about 5 in Loch Marie. The same sizes and ranking was observed in the 2014 experiment with no cover. As found in many species the mean berry weight dropped from a high level in the 2-5 week of harvest to lower values during the rest of the harvest period for each cultivar. In the best week Natchez had berry weights of 13 g/berry in the 2014 experiment. In the 2014 experiment the fruit were graded into saleable good fruits and discarded fruits with discoloration of drupes in the fruit, sooty mold and grey mould attack and other problems. The percentage of good fruit ranged from about 60% in Loch Ness and Loch Marie, to 50% for Loch Tay and Natchez, to between 30 and 40 % for Karaka Black, Navaho and Chester. Helen only reached 20 % good fruits. The attack of grey mould on fruits were higher without the plastic roof.

Plant architecture analyses showed that Natchez had on average only 6 flowers per flower-side-shoot and thus giving very few fruits overall. Much denser plantings and promotion of more florican shoots from the basis of each plant should potentially bring up the yield per running m of row. Chester and Navaho on the other hand had 37 and 31 flowers per flower-side-shoot giving a high number of fruits. Consumer tests over two years with more than 1000 people asked to grade selected cultivars showed that Loch Ness and Natchez were clearly preferred for their sweet and uniformly mature fruits, compared to Navaho and Chester. It is recommended to plant several cultivars to cover the full season from mid July to mid October in Denmark, even if Loch Ness alone may give fruit for most of this period. Karaka black with thorns and Helen seems not to be of interest in Danish organic conditions. Observations of the primocane cultivar Reuben grown in pots were done in plastic tunnel house and showed that fruits started to mature from late August and into September providing a late summer –autumn harvest. Without tunnel covers Reuben grown as primocanes will not reach fruit maturity in Danish conditions.

An ongoing black currant organic trial at AU Årslev holds 9 existing cultivars and 7 breeding clones from JHI, Scotland (refs. Ben Lomond, Ben Alder, Ben Hope, Ben Gairn, Ben Kilbreck, Ben Vane, Ben Finley, Intercontinental, Zusha). Plants were planted in 2010 with a slow start due to frost and attack of mice and moles. Data were recorded in 2014-2017. Zusha were flowering very early most years and this caused frost damage in several years with low and variable yield, even if the best years had very high yields. Ben Vane also flowered quite early. The test clone 9165-5 showed very late flowering and escaped frost in most years which gave yields even in spring frost years. This clone had the highest accumulated yield over 4 years (20 tons/ha) and was better than Ben Hope (14.7 tons/ha) and Ben Kilbreck (13.7 tons/ha). The clone 9443-6 gave 14.3 tons/ha and should also be studied further. Spring frost in 2014 and 2017 reduced yield in most cultivars and in some test clones. Plants scores for frost damage, and attack by Aphid, sawflies, tortrix, leaf spot and rust was given, as important indicators of adaption to organic production. Total acidity, soluble solids and total anthocyanins were listed showing important differences in berry quality. Results from previous organic trials 2009 -2011 with 13 cultivars showed that Ben Hope, Ben Lomond, Ben Tirran and Narve Viking gave the highest yields (7.8 -8.9 tons/ha) and that Narve Viking is of interest due to the high color, low acidity and mild taste of berries. Narve Viking was evaluated as the best cultivar for organics followed by Ben Lomond, Ben Hope and Ben Tirran. Conventional trials were performed in separate series from 2001-2004 (17 cultivars), 2002 – 2004 (10 cultivars) and 2003-2004 (13 cultivars). Yields from 9-12 tons/ha could be found in years with no frost problems.

For red currants an organic trial was done in 2009-2011 comparing 10 varieties of red currant. Red Poll (17 tons/ha) was followed by Roodneus (15.4 tons/ha) and Rovada and Augustus at about 14.5 tons/ha. Red Poll and Roodneus had clearly the highest color content. Both of these cultivars showed good resistance to diseases and good quality fruit and are recommended for organic production.

Domestication of European blueberries from Danish wild habitats was initiated in 2009 and are still ongoing in a third project. The first project 'Danish Blueberries: Development and activation of Danish genetic resources' focused on collection and initial description of a broad range of clones from all over Denmark and establishing common garden trials. The aim of the second project 'Propagation and cultivation of bilberry for future berry production' was to develop knowledge and methods that enable a development of a future Danish horticultural high value berry production of the native species bilberry (*Vaccinium myrtillus*). This will be the first orchard based production of this species in the world and will facilitate future mechanical harvesting of berries and thereby eliminate manual picking. The project investigated 1) efficient vegetative and generative propagation methods, 2) optimal

cultivation of bilberry plants from propagated plant to first flowering and berry set, 3) first evaluation of cultivation methods and orchard systems to optimise berry production and 4) knowledge on seed production and use of seeds for ecological engineering by direct seeding in semi-natural environments. The third and ongoing project 'Bærkvalitet i danske genressourcer af almindelig blåbær' focus on quantification and evaluation of volatile compounds (taste and sensory) by GCMS and compounds of importance to health aspects (LCMS) in more than 50 selected EB clones. This is ongoing.

Two projects have been done on *Aronia melanocarpa*: The aim of the first project 'Aronia – Production of tasty and health preserving berries' was to develop the basis for an increased Danish production of tasty and healthy Aronia products of high and uniform quality, as a prerequisite for development of Aronia products with functional claims on human health. The project focused on the following activities: 1.) Investigation of vegetative propagation methods, using different clones, different rooting hormones, winter cuttings or summer softwood cuttings, topophysis effects, 2.) Investigate variation in taste preferences and quality attributes (sugar, acid, colour) of berries depending on cultivars and harvest time. 3.) Investigate effect of extraction processing and postharvest treatment of berries and/or juice for improving taste and quality of products. 4. Characterisation of variation in bioactive compounds depending on cultivar, harvest time and processing treatments. HPLC analyses of anthocyanins, polyphenols and 5. Investigate effect of different fertilizer regimes on yield and quality of berries.

The second and ongoing project COLARO- extraction of nutraceuticals from pomace from juice production focus on how processing and juice pressing methods affect quality and color content of Aronia pomace. Results have been published in Food Chemistry.

The new species being tested in the DANBERRY project included 2 wild plums (*Prunus domestica*, Mirabelle), 1 highbush blueberry (*V. corymbosum*), 4 bush sour cherries (*P. cerasus*), 2 saskatoons (*Amelanchier alnifolia*, serviceberries), 4 goji-berries (*Lycium barbarum*), 5 japanese silverberries (*Eleagnus umbellata*), 4 cornelian cherries (*Cornus mas*), 5 hascaps (*Lonicera caerulea*, honeyberry), 2 white (red) currant, 2 green (black) currant, 1 hybrid black currant gooseberry, 4 gooseberries. Plants were planted in 2016/2017 and first harvest with New Holland 9090 Dual over-the-row harvester was done in summer-autumn 2017 and fruit analysis performed for some varieties. Preliminary evaluation suggest that it will be possible to harvest fruits from these species efficiently with good quality and with low or no damage to plants. Challenges with the diverse species and growing habits involve for example, controlling branching and size to fit to the harvester, pruning strategies and timing, shaping of bush to allow harvest and fruit set, fruit maturity and uniformity at harvest, avoid damage to shoots, possible use of machine harvested fruits fro fresh market and use as IQF. Since Danish consumers only know little of these new species and the taste and use of it, a considerable task of education and demonstration is needed to push this into the market.