Scanning report (EIP format for practice abstracts)

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

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

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Section A. Summary for EIP dissemination

***Keywords:** [Covered production, rain roof, scab, fruit quality, organic]

***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: No

***Summary (native language):**

Udvikling af regntag til brug i usprøjtet økologisk produktion af æbler

Økologisk produktion er for mange forbrugere synonym med usprøjtet produktion. Det er imidlertid ikke tilfældet for økologisk produktion af høj-værdig afgrøder som fx æble. Æblerne har en lang kulturtid, hvor skadevoldere har gode vilkår for opformering, samtidig er vækstsæsonen lang, og kravene til frugternes kosmetiske udseende høj. Alt dette nødvendiggør sprøjtning imod både svampesygdomme og insekter. For at bringe den økologiske produktion mere i overensstemmelse med forbrugernes forventninger, arbejdes der på at udvikle alternativer, som kan reducere eller helt overflødiggøre sprøjtning. Overdækning med et plastik regntag er en sådan foranstaltning. Regntag har i et 4 åriget forsøg vist sig meget effektiv til at forhindre angreb af skurv, der er den alvorligste sygdom på æble, og den der hyppigst sprøjtes imod. I forhold til usprøjtet produktion under åben himmel falder skurvangrebene fra 85 % til 5 %. Samtidig kan det dokumenteres at regntaget virker lige så effektivt som konventionel sprøjtning overfor rådsygdomme. Trods skyggeeffekt af regntaget har der ikke kunne påvises negative konsekvenser for hverken udbytte, frugtstørrelse eller frugtkvalitet. Der pågår arbejde med at udvikle et kommercielt og mere holdbart regntag, som pt testes i pære.

Summary (english):

Organic production is for many consumers equal to unsprayed production. When it comes to high-value crops like fruit in particular apples, this is not the case. Apples are a stationary, long lived culture with high demands for blemish-free fruit which necessitates spraying. In order to reduce spraying and bring organic production more in line with consumer expectancies alternative strategies are investigated. Covered production using a plastic rain roof is one such strategy. At the Institute of Food, AU we have documented that rainroofs are highly efficient in reducing scab, the most important fungal disease in apple, and the one requiring the most sprays. Over a four years period, the rain roof reduced scab occurrence from 85 % in the unsprayed control down to only 5 % of fruits of two very susceptible cultivars. The rain roofs proved as efficient against scab as the sprayed control, where sulphur and potassium bicarbonate were sprayed a total of 25-30 times per season. Brutto yield in the covered and sprayed treatments were at level, but brutto yield was reduced by 10-90% in the unsprayed control ('Aroma' was the best producing variety and 'Rubens'. Further, the rainroof reduced rot diseases significantly to just 2% of the stored fruit. The many sprays with sulphur and potassium bicarbonate had no effect on rots and in average 20% of the fruits from the un-covered organic production developed rots during storage and shelflife. Despite reduced light levels under the roof, no detrimental effects on neither yield, fruit size, fruit colour nor internal quality of fruit could be documented. Experiments involving a commercial covering system are on-going in pears, and preliminary results appear to confirm the results from the apple experiment.

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 (Waremme-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, Nl322 Alkmaar en omgeving, NL338 oost Zuid-Holland, NL33A zuidoost Zuid-Holland, NL341 Zeeuws-Vlaanderen, NL342 overig Zeeland, Nl411 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 Hamphshire, 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. Etablere et europæisk netværk med fokus på frugtsektoren
2. Udvikle og implementere en systematisk fremgangsmetode til at scanne og syntetisere eksisterende videnskabelig og praktisk viden til gavn for frugtsektoren i Europa
3. Løbende dialog med faglige politiske miljøer i EU-kommissionen, nationalt og regionalt
4. Identificere og støtte op om nye forskningsområder ved vedvarende afdækning og analysering af eksisterende og kommende forsknings- og innovationsaktiviteter.

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) • Pcfruit
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[1]

Scanning report
Marianne Bertelsen, AU

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Country: Denmark

NUTS 3 region(s)[2]: [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: WP3 – Reduction in pesticides residues

Date: 10-5-2017

Source materials and methodology

Consultations with colleagues at Aarhus University, Dept. Food Science to identify staff involved in research on relevant topics. The collection of publications and disseminations from the last approximately one year to provide a start for the state of art. The personal database over publications/disseminations (PURE database) for each scientist was used as basis.

Best practice findings

Investigating the potential of covered production of apples. Proof of concept.

[1] Equivalent to 'final report' in EIP-AGRI format.
[2] Please see ec.europa.eu/eurostat/ramon/nomenclatures/ for details on NUTS regions, level 3

The apple production in Denmark constitutes about 1400 ha, of which app. 20% is grown with organically. However, due to low yields in the organic production less than 10% of the apples sold are of organic origin. The main obstacles for the organic production are losses due to fungal disease, particular apple scab and fruit rots, but also insects are detrimental to production. The small acreage combined with restrictive environmental regulations limits the number of compounds available for pest management in the Danish organic apple production. Hence research has focused on alternative strategies. Also from a political point of view the organic movement is encouraging research into alternative solutions in order to bring the organic production in line with what the consumers perceives as organic, namely 'unsprayed'.

Based on experience from other high-value crops like strawberries and sweet cherries covered production constituted an unexploided approach to a non-chemical disease control in apples. In 2012, the first experiments using a proto-type of plastic covered rainroofs were conducted at the Department of food, in Aarslev. The experiment was conducted in a running organic trial where sprayed versus unsprayed strategies were compared. The roofs were erected over two cultivars 'Elstar and 'Rubens' both of which are very susceptible to scab. Already in the first experimental year the roofs proved highly efficient in preventing scab. Over the following three years the results were confirmed. In average of years, unsprayed trees under rain roofs produced the same yield of fruits free of scab as the sprayed treatment, where in average 20 fungal sprayed were used every year. Even more successful were the roof in terms of rot control. Rot diseases cannot be controlled by any of the compounds registered for organic production in Denmark. In average 20% of fruits rotted during storage and shelf-life when grown under either sprayed or unsprayed organic strategies. Under rain roof less than 3% of the fruits were affected by rots, an amount comparable to what is achieved in conventional production where fungicides with effect against rots are employed. The results further documented that, though light was reduced by up to 30% on days with high light intensity, the effect of photosynthesis was not as detrimental as expected. Trees received more diffuse light, and responded by producing more efficient shade leaves. Trees were less stressed during under the hot mid-day sun causing the mid-day depression of the photosynthesis to be less under the covered trees. No detrimental effect of the roofs on fruit yield, fruit size, fruit colour or internal on fruit quality could be documented.

Experiments involving a commercial covering system are on-going in pears, and preliminary results appear to confirm the results from the apple experiment.