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:** Marianne Bertelsen, Senior Scientist, Department of Food, Aarhus University (AU)

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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:

***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 årigt 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

[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

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.

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.

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **Europees netwerk rond fruit**

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

***Author/native language editor:** Dr. Wendy Van Hemelrijck , pcfruit, wendy.vanhemelrijck@pcfruit.be; +32(0)11/69.70.20

Dr. Dany Bylemans, pcfruit, dany.bylemans@pcfruit.be

Section A. Summary for EIP dissemination

***Keywords:** nebulization, postharvest, bumble bee vector,

***Main geographical location:** BE221 (Hasselt)

Other geographical locations: BE242 (Leuven), BE334 (Waremme-Borgworm), BE223 (Tongeren), BE236 (Sint-Niklaas), BE256 (Arr. Roeselare), BE253 (Ieper), BE211 (Arrondissement. Antwerpen)

***Summary (native language):**

Onderzoek is lopende omtrent biologische controle van bacterievuur en bewaarziekten bij appel en peer. Ter bestrijding van bacterievuur is onderzoek lopende om hommels als vector te gebruiken om biologische controle organismen van bacterievuur in de bloemen af te zetten. Voor de bestrijding van de bewaarziekte is onderzoek lopende waarbij biologische controle organismen worden verneveld in koelcellen. Voor beide onderzoeken is nog verder onderzoek nodig om het volledige potentieel hiervan te bepalen.

Summary (english):

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. Oprichten van een Europees netwerk rond fruit
2. Ontwikkelen en implementeren van een methode om lopend onderzoek en praktijkervaring te scannen en te niveleren
3. Houden van een dialoog met relevante gezaghebbers op regional, nationaal en Europees niveau
4. Exploreren van nieuwe topics in onderzoek door het uitvoeren van een survey naar reeds opgedane kennis en lopend onderzoek omtrent nieuwe innovaties.

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:**

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2. Research Station for Fruit npo (Belgium) • Pcfruit
3. Centre Technique Interprofessionnel des Fruits et Légumes (France) • CTIFL
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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
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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
[Van Hemelrijck, pcfruit]

Author: Dr. Wendy Van Hemelrijck , pcfruit, wendy.vanhemelrijck@pcfruit.be; +32(0)11/69.70.20

Country: Belgium

NUTS 3 region(s)[2]: BE221 (Hasselt)

WP no. and title: **3 – Reduction in pesticides residues**

Date: 14-04-2017

Source materials and methodology

Underneath the source materials are listed. Most of the fruit research for integrated farming is done by pcfruit so all the source

Protection of apple and pear flowers against fire blight infections using biocontrol organisms applied via bumble bees. S.Remy, B. Cotyn, J.Smessaert, M.Eeraerts, S.Peeters, M. Claes, M.Maes, G.Smagghe, W.Keulemans, O. Honnay, H. Schoofs, T.Deckers, 2016. IOBC XVI meeting, wg. Biocontrol, Berlin. In press

Dekeyser, Donald; Vanwalleghem, T; Ambaw, A.; Verboven, P.; Van Hemelrijck, W.; Nuyttens, D. (2016). Evaluation of fogging devices for BCO application in fruit cold storage rooms. Communications in Agricultural and Applied Biological Sciences: 68th International Symposium on Crop Protection. Vol. 81 3. ed. 2016. blz. 470.

Vanwalleghem, Tanja; Dekeyser, Donald; Nuyttens, David; Tsige, Alex; Verboven, Pieter; Van Hemelrijck, Wendy; Bylemans, Danny (2016). Influence of additives on the efficiency of biological control organisms against storage diseases. Ecofruit: Proceedings of the 17th International Conference on Organic Fruit-Growing, Vol. 17, 2016, blz. 180-183.

Vanwalleghem, Tanja; Dekeyser, Donald; Nuyttens, David; Tsige, Alex; Verboven, Pieter; Van Hemelrijck, Wendy; Bylemans, Danny (2016). Vaporization of biological control organisms in cold storage rooms to control postharvest diseases. Acta Hort. 1144, 121-127.

Clymans, R., Trekels, H., Boonen, M., Craeye, S., Hanssens, J., Smagghe, G., Vervoort, M., Melis, P., Bylemans, D., Belien, T. (2016). Matching commercial thrips predating phytoseids with the highly diversified climate conditions of different strawberry production systems. Acta Hortic. In Press.

Jaarverslag pcfruit 2016.

Best practice findings

Together with its project partners University of Ghent, University of Leuven and Flanders Research Institute for Agriculture, Fisheries and Food, the Fruit Research Station pcfruit is investigating the potential of bumble bees to transfer biocontrol organisms (BCOs) in apple and pear flowers for protection against fire blight (Erwinia amylovora) infection (i.e. entomovectoring). First results showed the potential of several existing BCOs, but the absent and limited flower visitation in pear ('Conference') and apple ('Jonagold'), respectively, require research in alternative approaches. The latter include testing an attractant for bumble bees on pear and apple flowers and combining spraying of BCOs at the beginning of bloom with additional secondary spreading by bumble bees.

Towards the control of storage diseases research is ongoing to apply biological control agents by nebulisation as postharvest treatment in the cold storage rooms. A computational fluid dynamics (CFD) model for the distribution of the biocontrol agent can be developed for this application based on the dimensions of the cold storage room. The research pointed out that biocontrol agents can be applied by this technique. Some further optimalisation is still needed for a more optimal distribution of the biocintrol agent in the storage room and the paloxes.

For thrips in strawberries guidelines on suitability of biological control agents (BCA's) (both arthropod predators and entomopathogens) for different climatic conditions are build up.

[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

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **Europees netwerk rond fruit**

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

***Author/native language editor:** Dr. Wendy Van Hemelrijck , pcfruit, wendy.vanhemelrijck@pcfruit.be; +32(0)11/69.70.20

Dr. Dany Bylemans, pcfruit, dany.bylemans@pcfruit.be

Section A. Summary for EIP dissemination

***Keywords:** Drosophila, Attract and Kill, orchard of future

***Main geographical location:** BE221 (Hasselt)

Other geographical locations: BE242 (Leuven), BE334 (Waremme-Borgworm), BE223 (Tongeren), BE236 (Sint-Niklaas), BE256 (Arr. Roeselare), BE253 (Ieper), BE211 (Arrondissement. Antwerpen)

***Summary (native language):**

Om de aanwezige residu's op het fruit te beperken wordt onderzoek uitgevoerd naar de geschikte toepassingsmomenten voor gewasbeschermingsmiddelen in de levenscyclus van plagen. Daarnaast worden alle onderzoeksresultaten die leiden tot een verminderd gebruik van gewasbeschermingsmiddelen toegepast in de percelen van de toekomst bij appel, peer en aardbei met als doel het uiteindelijke residu op de vruchten zo laag mogelijk te houden.

Summary (english):

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. Oprichten van een Europees netwerk rond fruit
2. Ontwikkelen en implementeren van een methode om lopend onderzoek en praktijkervaring te scannen en te niveleren
3. Houden van een dialoog met relevante gezaghebbers op regional, nationaal en Europees niveau
4. Exploreren van nieuwe topics in onderzoek door het uitvoeren van een survey naar reeds opgedane kennis en lopend onderzoek omtrent nieuwe innovaties.

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
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6. ~~East Malling Research (United Kingdom) • EMR~~ (terminated 08-02-2016)
7. Institut de Recerca i Tecnologia Agroalimentàries (Spain) • IRTA
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21. Institut National de la Recherche Agronomique (France) • INRA
22. NIAB EMR (new 09-02-2016)

Section C. Annex: Scanning report[1]

Scanning report
[Van Hemelrijck, pcfruit]

Author: Dr. Wendy Van Hemelrijck , pcfruit, wendy.vanhemelrijck@pcfruit.be; +32(0)11/69.70.20

Country: Belgium

NUTS 3 region(s)[2]: BE221 (Hasselt)

WP no. and title: **3 – Reduction in pesticides residues**

Date: 14-04-2017

Source materials and methodology

Underneath the source materials are listed. Most of the fruit research for integrated farming is done by pcfruit so all the source material is related to this research institute and their partners in these research topics:

Clymans, R., Bangels, E., Boonen, M., Bylemans, D., Vervoort, M., Melis, P., Craeye, S., Hanssens, J., Pisman, M., Smagghe, G., Belien, T. (2016). Increasing efficacy of thrips chemical control with attractive additives in strawberry. Proceedings of IOBC-WPRS Working Group "Integrated Plant Protection in Fruit Crops", Thessaloniki 04-08/09/2016. In Press.

Clymans, R., Trekels, H., Boonen, M., Craeye, S., Hanssens, J., Smagghe, G., Vervoort, M., Melis, P., Bylemans, D., Belien, T. (2016). Assessing the suitability of commercial thrips predatory mites for different strawberry production systems. Proceedings of IOBC-WPRS Working Group "Integrated Plant Protection in Fruit Crops", Thessaloniki 04-08/09/2016. In Press.

Clymans, R., Trekels, H., Boonen, M., Craeye, S., Hanssens, J., Smagghe, G., Vervoort, M., Melis, P., Bylemans, D., Belien, T. (2016). Matching commercial thrips predating phytoseids with the highly diversified climatic conditions of different strawberry production systems. Poster at 8th international Strawberry symposium, 13-17/08/2016, Québec, Canada.

S. Croes, T. Vanwalleghem, A. Ceustermans, S. Torfs, W. Keulemans, K. Heungens, W. Van Hemelrijck, V. Philion and D. Bylemans (2016). Rational and site specific control of apple scab. Ecofruit: Proceedings of the 17th International Conference on Organic Fruit-Growing, Vol. 17, 2016, blz. 164-166.

Jaarverslag pcfruit 2016

Best practice findings

Topics ongoing research:

For the control of thrips in strawberries, for cropping systems less favorable for predatory mite introduction or for insufficient control by predatory mites, guidelines on curative sprays are created. The application of PPP's based on entomopathogenic fungi has less repercussions on both beneficial arthropods and fruit residues. The application of standard insecticides in combination with attractive additives results in a higher spray efficacy and hence takes away the need to repeat an unsatisfying application.

For the control of *Drosophila suzukii*, insight in insecticide efficacy and target life stages in under investigation. Knowledge on which products are effective against which life stages is of high importance, futile sprays can hence be avoided. Research towards attractive additives/baits is carried out and first results indicate that insecticide efficacy can be significantly increased by adding certain additives. Further investigation will show if attractive additives can also enable the use of lower insecticide doses while keeping the same efficacy level or if attractive additives can enable the practice of "Attract and Kill". With "Attract and Kill", only a small proportion of the field or plant is sprayed (or the crop is not sprayed at all but the alley of grass is for instance). A standard blanket spray with an increased efficacy results in fewer insecticide applications. If baits can enable lower doses or

[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

smaller treated plant surfaces, the effects on fruit residues can be substantial. The research on the use of behaviour modifying compounds is not limited to attractive additives/baits (cfr. supra), it also comprises the concepts “mass trapping” , “repellents and deterrents” and their combination: “Push and Pull”. These concepts are based on semiochemicals and require no insecticides on the crop.

For the reduction of thrips in strawberries, for several cropping systems/seasonal periods a preventative introduction of predatory mites was advised and adopted by growers, significantly reducing the insecticide input.

To be able to set up a treatment schedule with low or no amount of residue at harvest research is going on in an apple, pear and strawberry orchard. To this end specific treatments schedules are set up with respect to the preharvest interval of pesticides to have ‘zero-residue’. Furthermore also all the findings of the research projects concerning reduction of residues are implemented in those orchards.

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **Europees netwerk rond fruit**

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

***Author/native language editor:** Dr. Wendy Van Hemelrijck , pcfruit, wendy.vanhemelrijck@pcfruit.be; +32(0)11/69.70.20

Dr. Dany Bylemans, pcfruit, dany.bylemans@pcfruit.be

Section A. Summary for EIP dissemination

***Keywords:** mix fruit cultivars

***Main geographical location:** BE221 (Hasselt)

Other geographical locations: BE242 (Leuven), BE334 (Waremme-Borgworm), BE223 (Tongeren), BE236 (Sint-Niklaas), BE256 (Arr. Roeselare), BE253 (Ieper), BE211 (Arrondissement. Antwerpen)

***Summary (native language):**

[space for short summary of scanning report in native language for EIP dissemination]

Summary (english):

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):**

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4. Exploreren van nieuwe topics in onderzoek door het uitvoeren van een survey naar reeds opgedane kennis en lopend onderzoek omtrent nieuwe innovaties.

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2. Develop and implement a systematic approach for scanning and synthesizing existing scientific and practical knowledge.
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4. Identify and support new priority areas of research by continually monitoring and analysing existing and upcoming research and innovation activities.

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22. NIAB EMR (new 09-02-2016)

Section C. Annex: Scanning report[1]

Scanning report
[Van Hemelrijck, pcfruit]

Author: Dr. Wendy Van Hemelrijck , pcfruit, wendy.vanhemelrijck@pcfruit.be; +32(0)11/69.70.20

Country: Belgium

NUTS 3 region(s)[2]: BE221 (Hasselt)

WP no. and title: **3 – Reduction in pesticides residues**

Date: 14-04-2017

Source materials and methodology

Underneath the source materials are listed. Most of the fruit research for integrated farming is done by pcfruit so all the source material is related to this research institute and their partners in these research topics:

Alhmedi A, Belien T (2016). Natuurlijke plaagbestrijding door combinatie soorten. Management & Techniek 21 (18 november 2016): 50-51.

Alhmedi A, Belien T (2016). Kersenteelt als combinatie met appelteelt voor de natuurlijke onderdrukking van bladluizen: evaluatie in een veldproef. Fruitteeltnieuws (jaargang 29): 19-20: 18-20.

Alhmedi, A., Raymaekers, S., Bylemans, D., Beliën, T. (2016). Potential role of fruit intercrops for parasitoid assisted integrated apple aphid management. Ecology of Aphidophaga 13, 29/08-01/09/2016.

Best practice findings

Topics ongoing research:

At this moment research is going on the effect of combined cultivation of apple and cherry to control aphids.

[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

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Dr. Dany Bylemans, pcfruit, dany.bylemans@pcfruit.be

Section A. Summary for EIP dissemination

***Keywords:** warnings, monitoring/management tools and models

***Main geographical location:** BE221 (Hasselt)

Other geographical locations: BE242 (Leuven), BE334 (Waremme-Borgworm), BE223 (Tongeren), BE236 (Sint-Niklaas), BE256 (Arr. Roeselare), BE253 (Ieper), BE211 (Arrondissement. Antwerpen)

***Summary (native language):**

Er is momenteel veel onderzoek lopende naar beslissingsondersteunende systemen. Zo worden vanuit pcfruit jaarlijks waarschuwingen verstuurd voor alle ziekten en plagen in alle fruitteelten in België. Jaarlijks worden de adviezen aangepast op basis van de bevindingen in lopende onderzoeken. Ook het monitoringssysteem voor nutiggen en plagen wordt geupdate als er nieuwe inzichten zijn, wat leidt tot een reductie in het gebruik van gewasbeschermingsmiddelen. Recent zijn ook enkele modellen bv. voor oorwormen, in de praktijk geintroduceerd welke een doordachter gebruik van gewasbeschermingsmiddelen introduceerden, wat leidt tot een daling van de residu's. Een aantal andere modellen zijn momenteel nog in testfase.

Summary (english):

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

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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
[Van Hemelrijck, pcfruit]

Author: Dr. Wendy Van Hemelrijck , pcfruit, wendy.vanhemelrijck@pcfruit.be; +32(0)11/69.70.20

Country: Belgium

NUTS 3 region(s)[2]: BE221 (Hasselt)

WP no. and title: **3 – Reduction in pesticides residues**

Date: 14-04-2017

Source materials and methodology

Underneath the source materials are listed. Most of the fruit research for integrated farming is done by pcfruit so all the source material is related to this research institute and their partners in these research topics:

Belien, T., Bangels, E., Brenard, N., Reijniers, J., Leirs, H., Bylemans, D. (2016). Optimized timing of IPM treatments against pear Psylla (*Cacopsylla pyri*) based on a temperature driven population dynamics model. Proceedings of IOBC-WPRS Working Group "Integrated Plant Protection in Fruit Crops", Thessaloniki 04-08/09/2016. In Press.

Alhmedi A, Belien T (2016). 'Schijnbare competitie' tussen bladluissoorten via gemeenschappelijke sluipwespen. Fruitteeltnieuws (jaargang 29) 13:4-7.

Belien, T., Brenard, N. (2016). Doordachte en gecoördineerde bestrijding van perenbladvlo dankzij nieuwe inzichten en ontwikkeling van een innovatief model. Fruit Revue (jaargang 68), 5 (mei): 13-16.

Vrancken, K. (2016). Nieuwe inzichten voor het bereiken van een evenwicht tussen perenbladvlo en diverse van zijn predatoren (New insights into reaching a balance between pear sucker and predators). European Fruit Magazine 2016 (3). 12-13.

Belien, T., Bangels, E., Goffin, J., Berkvens, N., De Ro, M., Casteels, H., Bylemans, D. (2016). Factors influencing attractant preferences of *Drosophila suzukii*: implications for monitoring population dynamics and IPM measures. IOBC-WPRS bulletin (IOBC Thessaloniki 04-08/09/2016. In Press.

De Ro, M., Devos, T.; Berkvens, N., Casteels, H., Goffin, J.; Beliën, T., De Clercq, P. (2016). Overwintering capacity of *Drosophila suzukii* (Diptera: Drosophilidae) in Belgium. IOBC-WPRS bulletin (IOBC Thessaloniki 04-08/09/2016. In Press.

Belien, T., Bangels, E., Goffin, J., Berkvens, N., De Ro, M., Casteels, H., Bylemans, D. (2016). Factors influencing attractant preferences of *Drosophila suzukii*: implications for monitoring population dynamics and IPM measures. Poster at the 9-th International Conference on Integrated Fruit Production, September 4-8, Thessaloniki.

De Ro, M., Devos, T.; Berkvens, N., Casteels, H., Goffin, J.; Beliën, T., De Clercq, P. (2016). Overwintering capacity of *Drosophila suzukii* (Diptera: Drosophilidae) in Belgium. Proceedings of IOBC-WPRS Working Group "Integrated Plant Protection in Fruit Crops", Thessaloniki 04-08/09/2016. In Press.

De Ro, M., Devos, T.; Berkvens, N., Casteels, H., Goffin, J.; Beliën, T., De Clercq, P. (2016). Cold hardiness of *Drosophila suzukii* (Diptera: Drosophilidae) in Belgium. Publication in proceedings of the 68th International Symposium on Crop Protection, 17/05/2016, Ghent. In Press.

Jaarverslag pcfruit 2016.

Best practice findings

Topics already introduced in practice:

Pcfruit sends out specific warnings to fruit growers and advisory organisations to inform them about the infection risk of several diseases (scab, powdery mildew, based on prediction models) or pests. They also send out a 'IPM message' at a regular base

[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

to the fruit growers and advisory organisations to inform about the specific stages in phenological development for different pests or to inform about development of diseases. Every time new insights or research results are present, these results are incorporated in the warnings.

Guidelines and tools for the augmentation and safeguarding of earwigs as important predators of wooly apple aphid and pear psylla are developed; e.g. the online application Earwig Management Tool (https://www.pcfruit.be/nl/fruitteler/bedrijfsbegeleiding/earwig-management-tool), a tool for growers to consider side-effects/noxious effects of plant protection products (PPP's) and soil disturbance on the earwig population. This tool and guidelines contribute to the reliability of biological control and therefore reduces the number of insecticide sprays. Guidelines on how to profit from these additional predators, with emphasis on side-effects of common used PPP's. Towards the end of the project the auctions reported a reduction in the amount of pear sucker related residues on pears.

An inventory/description of orchard associated aphids and parasitoids have contributed to an overview of possible "banker plants" and has delivered insights in species that can be commercialized for aphid control in orchards. The release of mass reared parasitoids appeared ready for implementation in certain crops. Biological control with parasitoids, combined with the monitoring of parasitation and aphid colonies, can significantly decrease the insecticide input.

For the control of *Drosophila suzukii* monitoring guidelines are delivered and readily adopted by growers. Monitoring significantly reduces the amount of sprays by taking away the sprays when the pest is not yet present in the plot. The on-farm monitoring is assisted by the advisory services of pcfruit npo.

Topics close to dissemination:

A population dynamics models of pear Psylla as well as the main beneficials was developed and is currently further evaluated by the advisory service of pcfruit npo. The model predicts the proportions of pear sucker life stages for a certain moment and certain area, based on climatic data from all over Flanders. The model, together with similar models of key predators is combined in an online application. The application enables a substantiated decision-making by pear growers, allowing them to apply insecticides exactly on their optimal moment (pear sucker life stage) while also considering the effects on the predators. The developed tool results in fewer but well positioned insecticide sprays against pear sucker.

Topics ongoing research:

Models for the control of Botrytis cinerea and Powdery mildew on strawberry are under investigation. Guidelines for monitoring key pests in strawberry are under investigation: setting thresholds, identification help, methodology. Main purpose is demonstration for growers, making them aware of the added value of monitoring pests and beneficials. Knowledge of the pest population size and phenology leads to optimized insecticide usage, meaning higher efficacy and less treatments needed. A first step towards the use of drones equipped with spectral sensors for fire blight detection was achieved by identification and validation of suitable wavelengths. However, the accuracy of 52-54% for correct identification of the tree status (healthy or infected) is not sufficient yet for practical implementation of the technique and warrants further improvement.

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **Europees fruit netwerk**

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

***Author/native language editor:** Dr. Wendy Van Hemelrijck , pcfruit, wendy.vanhemelrijck@pcfruit.be; +32(0)11/69.70.20

Dr. Dany Bylemans, pcfruit, dany.bylemans@pcfruit.be

Section A. Summary for EIP dissemination

***Keywords:** selection varieties

***Main geographical location:** BE221 (Hasselt)

Other geographical locations: BE242 (Leuven), BE334 (Waremme-Borgworm), BE223 (Tongeren), BE236 (Sint-Niklaas), BE256 (Arr. Roeselare), BE253 (Ieper), BE211 (Arrondissement. Antwerpen)

***Summary (native language):**

Op de proeftuinen van pcfruit is onderzoek lopende naar de gevoeligheid van nieuwe variëteiten bij appel peer en aardbei voor ziekten en plagen.

Summary (english):

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. Oprichten van een Europees netwerk rond fruit
2. Ontwikkelen en implementeren van een methode om lopend onderzoek en praktijkervaring te scannen en te niveleren
3. Houden van een dialoog met relevante gezaghebbers op regional, nationaal en Europees niveau
4. Exploreren van nieuwe topics in onderzoek door het uitvoeren van een survey naar reeds opgedane kennis en lopend onderzoek omtrent nieuwe innovaties.

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
[Van Hemelrijck, pcfruit]

Author: Dr. Wendy Van Hemelrijck , pcfruit, wendy.vanhemelrijck@pcfruit.be; +32(0)11/69.70.20

Country: Belgium

NUTS 3 region(s)[2]: BE221 (Hasselt)

WP no. and title: **3 – Reduction in pesticides residues**

Date: 14-04-2017

Source materials and methodology

Underneath the source materials are listed. Most of the fruit research for integrated farming is done by pcfruit so all the source material is related to this research institute and their partners in these research topics:

Jaarverslag pcfruit 2016

Best practice findings

Topics ongoing research:

At the demonstration gardens at pcfruit research is ongoing to test different varieties of apple, pear and strawberries for their resistance towards diseases and pest to select new varieties so that in the future less pesticides need to be used. Yearly specific varieties are selected for further research. For apple and pear, quality of the fruit is an important criteria bud also resistance towards scab and powdery mildew are selection criteria. Also for strawberries quality and taste are important criteria but also susceptibility towards soil borne disease, Botrytis fruit rot and powdery mildew.

[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

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **Europees netwerk rond fruit**

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

***Author/native language editor:** Dr. Wendy Van Hemelrijck , pcfruit, wendy.vanhemelrijck@pcfruit.be; +32(0)11/69.70.20

Dr. Dany Bylemans, pcfruit, dany.bylemans@pcfruit.be

Section A. Summary for EIP dissemination

***Keywords:** nets

***Main geographical location:** BE221 (Hasselt)

Other geographical locations: BE242 (Leuven), BE334 (Waremme-Borgworm), BE223 (Tongeren), BE236 (Sint-Niklaas), BE256 (Arr. Roeselare), BE253 (Ieper), BE211 (Arrondissement. Antwerpen)

***Summary (native language):**

Onderzoek is lopende dat aantoond dat het gebruik van specifieke netten zeer nuttig is in de controle van *Drosophila suzukii* in bepaalde teelten waardoor de behandelingen tegen deze plaag sterk gereduceerd kunnen worden.

Summary (english):

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,

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

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

1. Oprichten van een Europees netwerk rond fruit
2. Ontwikkelen en implementeren van een methode om lopend onderzoek en praktijkervaring te scannen en te niveleren
3. Houden van een dialoog met relevante gezaghebbers op regional, nationaal en Europees niveau
4. Exploreren van nieuwe topics in onderzoek door het uitvoeren van een survey naar reeds opgedane kennis en lopend onderzoek omtrent nieuwe innovaties.

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.
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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
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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
[Van Hemelrijck, pcfruit]

Author: Dr. Wendy Van Hemelrijck , pcfruit, wendy.vanhemelrijck@pcfruit.be; +32(0)11/69.70.20

Country: Belgium

NUTS 3 region(s)[2]: BE221 (Hasselt)

WP no. and title: **3 – Reduction in pesticides residues**

Date: 14-04-2017

Source materials and methodology

Underneath the source materials are listed. Most of the fruit research for integrated farming is done by pcfruit so all the source material is related to this research institute and their partners in these research topics:

Jaarverslag pcfruit 2016

Best practice findings

Topics ongoing research:

Guidelines on the use of specific nets/insect gauze as a physical barrier for whole plots or individual rows are created for the control of *Drosophila suzukii* on small fruits and cherries. It seems that netting is an investment that is proven to reduce the amount of sprays to nearly zero.

[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

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **Europees fruit netwerk**

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

***Author/native language editor:** Dr. Wendy Van Hemelrijck , pcfruit, wendy.vanhemelrijck@pcfruit.be; +32(0)11/69.70.20

Dr. Dany Bylemans, pcfruit, dany.bylemans@pcfruit.be

Section A. Summary for EIP dissemination

***Keywords:** movable wall, EVA-app

***Main geographical location:** BE221 (Hasselt)

Other geographical locations: BE242 (Leuven), BE334 (Waremme-Borgworm), BE223 (Tongeren), BE236 (Sint-Niklaas), BE256 (Arr. Roeselare), BE253 (Ieper), BE211 (Arrondissement. Antwerpen)

***Summary (native language):**

In België maken sinds 2016 een deel van de telers al gebruik van de EVA-app voor het plannen en de registratie van al hun behandelingen. Deze app helpt de telers bij het voorbereiden van de spuitoplossing en voorkomt dat foute producthoeveelheden worden gehanteerd bij de bespuitingen. Daarnaast werd een test ontwikkeld om na te gaan of het spuittoestel goed is afgesteld. In 2016 en 2017 trekt pcfruit doorheen België om bij de telers die dit wensen te controleren of hun spuittoestel goed is afgesteld.

Summary (english):

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. Oprichten van een Europees netwerk rond fruit
2. Ontwikkelen en implementeren van een methode om lopend onderzoek en praktijkervaring te scannen en te niveleren
3. Houden van een dialoog met relevante gezaghebbers op regional, nationaal en Europees niveau
4. Exploreren van nieuwe topics in onderzoek door het uitvoeren van een survey naar reeds opgedane kennis en lopend onderzoek omtrent nieuwe innovaties.

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
[Van Hemelrijck, pcfruit]

Author: Dr. Wendy Van Hemelrijck , pcfruit, wendy.vanhemelrijck@pcfruit.be; +32(0)11/69.70.20

Country: Belgium

NUTS 3 region(s)[2]: BE221 (Hasselt)

WP no. and title: **3 – Reduction in pesticides residues**

Date: 14-04-2017

Source materials and methodology

Most of the fruit research for integrated farming is done by pcfruit so all the source material is related to this research institute and their partners in these research topics:

Jaarverslag pcfruit 2016.

Best practice findings

Topics already introduced in practice:

Pcfruit developed a spray test with a movable wall to check the accuracy of your spray installation. Fruit growers can test their spray application with this test to see if the nozzles are adjusted well to spray their orchards. As such they are informed about spray deposit, spray losses, … In 2016 and 2017 pcfruit is organizing specific days across Belgium to test the spray installations of the fruit growers. In the beginning of 2017 in total 160 sprayers are checked by pcfruit. 159 of those sprayers needed some adjustment, so only 1 sprayer sprayed correctly. For each sprayer a report is given to the fruit grower which indicates the adjustments done to correct the spray application.

The 'EVA' app for professional fruit growers, which is developed by pcfruit, is used by fruit growers to plan their applications and set up their spraying schedule. In 2017 155 fruit growers used the EVA-app already. A demonstration of how to use the app was given to each fruit grower which used the app. If there are problems, the fruit growers can contact pcfruit to solve the problem with the app.

[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

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **[EUFRUIT : réseau européen pour les fruits]**

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

***Author/native language editor:** [Mrs. ZAVAGLI Franziska, Ctifl, 28, route des Nébouts – 24130 Prigonrieux (France), zavagli@ctifl.fr, 00/33/5.53.58.13.10]

Section A. Summary for EIP dissemination

***Keywords:** [reduce use of pesticides and limit residues on fruits and in the environment; application on apples]

***Main geographical location:** [FR611 Dordogne, FR244 Indre-et-Loire, FR633 Haute-Vienne, FR628 Tarn-et-Garonne, FR813 Hérault, FR826 Vaucluse]

Other geographical locations: [FR211 Ardennes, FR241 Cher, FR244 Indre-et-Loire, FR246 Loiret, FR301 Nord, FR302 Pas-de-Calais, FR411 Meurthe-et-Moselle, FR412 Meuse, FR413 Moselle, FR414 Vosges, FR421 Bas-Rhin, FR422 Haut-Rhin, FR432 Jura, FR433 Haute-Saône, FR511 Loire-Atlantique, FR512 Maine-et-Loire, FR514 Sarthe, FR515 Vendée, FR532 Charente-Maritime, FR533 Deux-Sèvres, FR534 Vienne, FR611 Dordogne, FR614 Lot-et-Garonne, FR615 Pyrénées-Atlantiques, FR623 Haute-Garonne, FR628 Tarn-et-Garonne, FR631 Corrèze, FR632 Creuse, FR633 Haute-Vienne, FR712 Ardèche, FR713 Drôme, FR714 Isère, FR716 Rhône, FR717 Savoie, FR718 Haute-Savoie, FR721 Allier, FR722 Cantal, FR723 Haute-Loire, FR811 Aude, FR812 Gard, FR813 Hérault, FR815 Pyrénées-Orientales, FR821 Alpes-de-Haute-Provence, FR822 Hautes-Alpes, FR823 Alpes-Maritimes, FR824 Bouches-du-Rhône, FR825 Var, FR826 Vaucluse]

***Summary (native language):**

Le projet ECOPHYTO réseau national pomme porte sur l'évaluation de systèmes de production de pomme combinant différentes techniques de protection contre les bio-agresseurs, d'entretien du sol et de maîtrise de la charge des arbres. Il est conduit sur six sites d'expérimentation représentatifs de la production de pomme française, et coordonné par le Ctifl. Le principe est d'analyser l'intérêt et la faisabilité des stratégies mises en œuvre et de calculer des indicateurs techniques, économiques et environnementaux. L'ensemble des leviers sont actionnés : la génétique, la prophylaxie, le Bio-contrôle, la protection physique, la lutte biologique, la mécanisation, les techniques de pulvérisation, le raisonnement des traitements chimiques et la production en AB (Agriculture Biologique). Le présent rapport porte sur les résultats de la campagne 2016.

Summary (english):

The project ECOPHYTO national apple network aims to evaluate apple production systems combining different strategies to protect crops from pests and diseases, to maintain the soil and to manage crop load. It is conducted on six experimental sites that are representative of French apple production and is coordinated by the Ctifl. The aim is to analyze the efficacy and feasibility of strategies that are implemented and to define technical, economic and environmental indicators. All the levers are used: genetics, prophylaxis, biocontrol, physical control measures, biological control, mechanization, spraying techniques, reasoned chemical control and organic agriculture. The present report stays for the results of year 2016.

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. Etablir un réseau européen orienté vers le secteur des fruits.
2. Développer et mettre en place une approche systématique pour « scanner » et synthétiser les connaissances scientifiques et pratiques existantes.
3. Etablir un dialogue permanent avec les politiques européennes, nationales et régionales pertinentes.
4. Identifier et supporter les nouveaux axes de recherche prioritaires en suivant continuellement et analysant les activités de recherche et d'innovation existantes et à venir.

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
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17. Fruitconsult BV (Netherlands) • FC
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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
[ZAVAGLI Franziska, Ctifl]

Author: [Mrs. ZAVAGLI Franziska, Ctifl, zavagli@ctifl.fr, 00/33/5.53.58.13.10]

Country: [France]

NUTS 3 region(s)[2]: [FR611 Dordogne, FR244 Indre-et-Loire, FR633 Haute-Vienne, FR628 Tarn-et-Garonne, FR813 Hérault, FR826 Vaucluse]

WP no. and title: [3 – Reduction in pesticides residues]

Date: [07-05-2017]

Source materials and methodology

The present scanning report is a synthesis of the results obtained in 2016 by the French national apple network, composed by five experimental stations in fruits (La Morinière, Invenio, Cefel, Cehm, La Pugère) and coordinated by the Ctifl. The network was established in a six years ECOPHYTO project (2012 – 2018), funded by ONEMA. The principle is to combine several alternatives to chemical control in order to reduce the use of pesticides and limit the risk to find pesticides residues on fruits. Agronomic and economic indicators are evaluated for each production system. In total, 28 orchards, from 500 to 5200 m^2, are studied during the whole season. Two different type of varieties have been chosen : one group is sensible to apple scab, the other is resistant. The apple scab management is based on the risk model “Rimpro”, the presence of apple scab lesions on leave shoots, the use of “alternative” fungicides to “chemical” fungicides and also plastic covers to protect trees from rain. Codling moth protection is done by granulosis virus applications, mating disruption with pheromones and nets (Alt’Carpo). Thinning and weed control may be done in a mechanical way. Two innovative spray application are tested : a fixed spraying system with micro-sprinklers on the top of the trees and a adapted dose and spray volume based on the volume of the tree hedge.

Sources :

- Le réseau national DEPHY EXPE Ecophyto Pomme. Les enseignements à mi-parcours. Zavagli F., Infos Ctifl, n°325, octobre 2016.
- Rapport annuel du projet ECOPHYTO DEPHY Expé réseau national Pomme – campagne 2016, mars 2017.
- Réduction d’emploi des produits phytosanitaires. Couvrir les pommiers avec une bâche anti-pluie. Zavagli F., Verpont F., Giraud M., Favareille J., Infos Ctifl, n°322, juin 2016.
- Appliquer autrement les produits phytosanitaires. Lancement du projet CADAR PULVÉFIX. Verpont F., Favareille J., infos Ctifl, n°321, mai 2016.
- Le projet PULVARBO piloté par le Ctilf. Comment optimiser la pulvérisation en arboriculture fruitière ? Verpont F., Favareille J., Prince Peter, Infos Ctifl, n°328, janvier-février 2017.

[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

Best practice findings

The use of chemical pesticides is calculated by an indicator, the treatment frequency index (TFI). The indicators takes into account the applied doses, the number of fungicides, insecticides, herbicides and other products like for thinning used in one season, and the treated surface. To measure the reduction of chemical pesticides, the different ECOPHYTO systems are compared to regional references led with a sensitive apple scab variety. **Table 1 and 2** describe the level of pesticides reduction achieved in 2016 depending of the diseases and insects pressure and the combined protection strategies. 2016 was a year with a medium to high apple scab pressure all over the different apple production areas. The number of primary infection was in average arround 10, but could achieve 17 at Ctifl. For the secondary infection the risk on fruits were very different from one region to another (from 0 to 9).

Percentage reduction in pesticides	Max. 22 %	between 55 and 65 %	Superior to 80 %
In case of resistant varieties to apple scab	Adapted apple scab management to resistance varietiés against apple scab. Possibility to reduce the number of fungicides on primary and secondary infections. Use of chemical fungicides. Important codling moth pressure. The strategy is mostly based on chemical insecticides..	Adapted apple scab management to resistance varietiés against apple scab. Possibility to reduce the number of fungicides on primary and secondary infections. Use of ”alternative” fungicides like bicarbonate, sulphur or limesulphur. Two different situations : - Important codling moth pressure : Alt'Carpo nets completed by chemical insecticides or - Low codling moth preasure : Combination of chemical and bio-control insecticides.	- Genetics and organic production with mating disruption or Alt'Carpo nets and some complementary Bio-control insecticides. or -Genetics and adapted doses, combined with Alt'Carpo nets and some complementary insecticides. or -Genetics, Alt'Carpo nets, but without codling moth pressure. The used fungicides are alternatives to chemical fungicides.

Table 1 : possible reduction of the TFI in the resistant varieties sytems – french national ECOPHYTO apple network - 2016

Percentage reduction in pesticides	Max. 8 %	between 18 and 32 %	Superior to 50 %
In case of sensitive varieties to apple scab	No or very low possibility to reduce the number of fungicides. Alt'Carpo nets with complementary chemical treatments on the first generation.	-Possibility to adapt the strategy to the apple scab risk on the primary and secondary infections. Use of ”alternative” fungicides. -Reduced number of chemical insecticides with an Alt'Carpo nets. Or -Mating disruption with biocontrol insecticides.	-Rain cover and mating disruption with chemical and biocontrol insecticides Or -Rain cover and Alt'Carpo nets with limited insecticideuse. Or -adapted doses and Alt'Carpo nets.

Table 2 : possible reduction of the TFI in the sensitive varieties sytems – french national ECOPHYTO apple network - 2016

Regarding the pesticides residues, each apple system (ECOPHYTO and reference) is analyzed at harvest. In 2016, the results are a maximum of 4 residues detected for the ECOPHYTO strategy while in the reference the maximum can reach 8. All together, the residues concentration level is low, generaly beneath 10 % of the MLR (maximum level of residues). By summing the percentages of each detected MLR, the amount is, excepted for one case, beyond 30 %, corresponding to the requirements of some retailers.

Table 3 gives five exemples of economic and agronomic indicators for apple systems which had a reduction of their TFI at more than 50 %. In green the economic indicator has a ”low” value, in orange a ”medium” value and in red a ”high” one. For the sanitary state, green means ”good” control, ”orange” ”medium” control and red an ”insufficient” control.

Type of system	commercial yield	Value of the chemical TFI (without biocontrol)	Plant protection cost (products & equipments)	Mechanisation costs	Hours for manual and mechanised work	Sanitary state of the orchard
Resistant + organic + Alt'Carpo	55 t/ha	0,32	< 1000 €/ha	< 760 €/ha	500 – 1000 h/ha	
Resistant + adapted doses + Alt'Carpo	25 t/ha	4,15	< 1000 €/ha	< 760 €/ha	< 500 h/ha	Because of Powdery mildew
Sensitive + adapted doses + Alt'Carpo	36 t/ha	7,25	< 1000 €/ha	< 760 €/ha	< 500 h/ha	Development of apple scab
Sensitive + rain cover + Alt'Carpo	30 t/ha	7,45	> 1500 €/ha	< 760 €/ha	500 – 1000 h/ha	Presence of Woolly aphids
Sensitive + rain cover + mating disruption	23 t/ha	13,49	> 1500 €/ha	< 760 €/ha	> 1000 h/ha	Because of Powdery mildew

In conclusion, the reduction of pesticides is possible by combining different technics and strategies, but the economic and agronomic may be affected and have to be taken into account.

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **[EUFRUIT: Réseau thématique européen sur les fruits]**

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

***Author/native language editor:** [Muriel Millan,Ctifl centre de Balandran, 751 Chemin de Balandran 30127 BELLEGARDE, millan@ctifl.fr, 0033466017715]

Section A. Summary for EIP dissemination

***Keywords:** [cherries, apricots, plums orchards, system approach, low-input, longitudinal survey, decision rule, multicriteria evaluation]

***Main geographical location:** [FR412 Meuse, FR614 Lot-et-Garonne, FR628 Tarn-et-Garonne, FR815 Pyrénées-Orientales, FR812 Gard, FR824 Bouches-du-Rhône, FR826 Vaucluse]

Other geographical locations: [FR211 Ardennes, FR241 Cher, FR244 Indre-et-Loire, FR246 Loiret, FR301 Nord, FR302 Pas-de-Calais, FR411 Meurthe-et-Moselle, FR413 Moselle, FR414 Vosges, FR421 Bas-Rhin, FR422 Haut-Rhin, FR432 Jura, FR433 Haute-Saône, FR511 Loire-Atlantique, FR512 Maine-et-Loire, FR514 Sarthe, FR515 Vendée, FR532 Charente-Maritime, FR533 Deux-Sèvres, FR534 Vienne, FR611 Dordogne, FR623 Haute-Garonne, FR631 Corrèze, FR632 Creuse, FR633 Haute-Vienne, FR712 Ardèche, FR713 Drôme, FR714 Isère, FR716 Rhône, FR717 Savoie, FR718 Haute-Savoie, FR721 Allier, FR722 Cantal, FR723 Haute-Loire, FR811 Aude, FR813 Hérault, FR815 Pyrénées-Orientales, FR821 Alpes-de-Haute-Provence, FR822 Hautes-Alpes, FR823 Alpes-Maritimes, FR825 Var, FR831 Corse-du-Sud, FR832 Haute-Corse]

***Summary (native language):**

Le projet Dephy Expé Ecophyto CAP-ReD consiste à suivre des dispositifs innovants pour réduire d'au moins 50% l'utilisation des produits phytosanitaires sur un ensemble de cultures de fruits à noyau : Abricotier, Cerisier, Prunier américano-japonais, Prunier d'Ente et Mirabelliers. Ce projet est un réseau d'expérimentation système regroupant 9 partenaires (2 unités INRA, Ctifl, 6 stations régionales d'expérimentation) localisés sur 9 sites expérimentaux répartis dans les principales régions de production de France. Le projet vise à concevoir et évaluer des vergers de cerise, abricot, prune économes en produits phytopharmaceutiques et en intrants. Il évalue au total 26 systèmes dont 10 systèmes servant de référence (REF) reproduisant les pratiques locales des producteurs et 16 systèmes économes en produits phytosanitaires (ECO). Si les premiers résultats sont encourageants d'un point de vue réduction de l'IFT (-62% des IFT dans les systèmes ECO), une évaluation multi-critères est indispensable pour prendre en compte l'ensemble des performances en particulier les aspects économiques (perte de rendement commercialisable dans les systèmes ECO). Ces premiers résultats sont aussi fortement dépendants de la jeunesse des vergers et les expérimentations doivent se poursuivre.

Summary (english):

The Dephy Expé Ecophyto CAP-ReD project consists in monitoring innovative measures aiming to reduce by 50% the use of chemical plant protection products on the following stone fruit crops: apricots, cherries, as well as Japanese-type, prune-type and Mirabelle plums. The project is a cropping system experimentation network comprising 9 partners (2 INRA research units, Ctifl, and 6 regional experimental stations) located at 9 experimental sites covering France's main production areas. Its goal is to develop and assess low-chemical, low-input cherry, apricot and plum orchards. Overall, 26 systems are assessed, including 10 used as a reference (REF), which reproduce the practices of local growers, and 16 using less chemicals (ECO). Although early results seem promising regarding the reduction of the treatment frequency index (IFT: -62% in the ECO systems), a multi-criteria assessment is essential to take into account all performance factors, and particularly the economic aspects (loss or marketable yield in the ECO systems). Those early results are also heavily linked to the young age of the orchards, and experiments are to be continued.

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. Créer un réseau européen sur le secteur des fruits
2. Développer et mettre en place une approche systémique pour le recensement et la synthèse de connaissances pratiques et scientifiques existantes
3. Mettre en place un dialogue avec les instances politiques européennes, nationales et régionales pertinentes
4. Identifier et promouvoir de nouvelles thématiques de recherche grâce à une veille et une analyse des activités de recherche et d'innovation existantes et à venir

Project Objectives (English):

5. Establish a European network focused on the fruit sector.

6. Develop and implement a systematic approach for scanning and synthesizing existing scientific and practical knowledge.
7. Establish an ongoing dialogue with relevant EU, national and regional policy bodies.
8. 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) • AREFLH
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
[MILLAN Muriel, Ctifl]

Author: [Muriel Millan,Ctifl centre de Balandran, 751 Chemin de Balandran 30127 BELLEGARDE, millan@ctifl.fr, 0033466017715]

Country: [France]

NUTS 3 region(s)[2]: [FR412 Meuse, FR614 Lot-et-Garonne, FR628 Tarn-et-Garonne, FR815 Pyrénées-Orientales, FR812 Gard, FR824 Bouches-du-Rhône, FR826 Vaucluse]

WP no. and title: [3 – Reduction in pesticides residues]

Date: [22/06/2017]

Source materials and methodology

The present scanning report is a synthesis of the results obtained in 2016 by the French national cherries, apricots, plums network, composed by eight partners specialized on stone fruits (BIP, Cefel, Centrex/CA66, Serfel, La Pugère, La Tapy, Arefe, INRA) and coordinated by the Ctifl. The network was established in a six years ECOPHYTO project (2013 – 2018), funded by ONEMA.

The means implemented in order to achieve the desired reduction of chemical inputs are based on a combination of different categories of options for action:

i) structural choices made during the planting of the orchard (cultivar x rootstock, planting distances, training system), irrigation system, protection (cover, net)
ii) yearly strategies for technical management, integrating combinations of alternative methods:
- row maintenance using alternative (non-chemical) techniques for weed control (mechanical, mulching, etc.),
- growing methods relying more on prevention, reducing the risk of development of pests and pathogens by changing tree architecture, …), and hydromineral nutrition,
- techniques improving spraying or treatment efficiency,
- using biocontrol products and mating disruption,
- choosing active ingredients presenting a better technical efficacy/ecotoxicological profile ratio and few side effects on beneficials,
- methods aiming to enhance and retain biodiversity of communities (providing habitats and resources for beneficials by planting species-rich hedges, …) in order to increase the chances of ecological regulation within those systems.

iii) accepting higher risk levels (tolerance threshold for pest and pathogen populations, renouncing certain “preventive” treatments, …).

Sources:

- Annual (march 2017)l : MILLAN M. (2016). CAP red - Conception et évaluation multisite de vergers d’abricot, cerise, prune économes en produits phytosanitaires et en intrants. Rapport technique de la campagne 2016
- Dephy Expé Ecophyto en arboriculture. Présentation et objectifs du projet CAP-RED. Loquet B.. InfosCtifl, n°302, juin 2014.
- Présentation Réseau national Expé Ecophyto CAP ReD. Bilan 2013-2016. MILLAN M. Rencontres phytosanitaires Ctifl/DGAL – SDQPV fruits à noyau, Ctifl Balandran, 6 octobre 2016.

[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

Best practice findings

The results are still heavily dependent on the young age of the orchards (plantings carried out mainly in 2013). During the first 3 years, 9 of the 13 ECO systems were very young (1 to 3 years old) and were not producing. The young orchards had no difficulty reducing their IFT, some even by 100%, and on average by 62% in the ECO systems as compared to the reference system for integrated fruit production.

This reduction was due partly to the abandon of the use of herbicides, in most cases attaining a zero-herbicide level, thanks to techniques such as soil management and mulching. However, an efficient option for weed control is essential on young trees, so as not to compromise vigour, i.e. the adult trees' production potential.

The reduction of the $IFT_{excl.\ green}$ (i.e. overall chemical IFT not including biocontrol products) is also linked to a reduction of insecticides in young orchards, where problems of insects (codling moth, fruit fly, …) attacking fruits are inexistent. Moreover, for two years now, the use of nets and covers on some sites, for instance on cherry trees, has proved efficient to reduce the $IFT_{excl.\ green}$ and to control fruit flies. The reduction of fungicide use is less extensive, because certain diseases, such as *Monilia*, rust and powdery mildew, attack shoots and leaves, and may cause serious damage (defoliation), with a risk of the inoculum establishing itself in the orchard.

The adult orchards are orchards in full production. In those orchards, the $IFT_{excl.\ green}$ was also reduced, on average by 53% in all adult orchards, between 2013 and 2015.

Both in the young and in the adult orchards, the major part of the IFT consists of fungicide treatments.

The effect of the $IFT_{excl.\ green}$ reduction on yield loss was measured in the adult orchards. The loss varies according to the year and the site, ranging from 0 to 88%, with an average of 30%.

However, those early results are to be consolidated over the orchards' lifespan.

A multi-criteria assessment is also necessary to determine acceptable compromises between economic values and the advantages associated with reduced input consumption and less impact on the environment.

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **EUFRUIT: Europäisches Obstnetzwerk**

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

***Author/native language editor:** Hinrich H. F. Holthusen, ESTEBURG – Obstbauzentrum Jork, Dep. Plant Protection and Diagnostics, Email: Hinrich.Holthusen@lwk-niedersachsen.de, Tel.: +49-4162-6016-131

Section A. Summary for EIP dissemination

***Keywords:** *Anthocoris* spp., apple, aphid, *Aphis pomi*, *Cacopsylla pyri, Drosophila suzukii, Dysaphis plantaginea*, insecticide, *Lygocoris pabulinus*, mulching, non-synthetic agents, pear, pesticide residues, population dynamic, stone fruit

***Main geographical location:** DE6 (Hamburg); DE9 (Niedersachsen)

Other geographical locations: DE8 (Mecklenburg-Vorpommern), DEF0 (Schleswig-Holstein), DEE0 (Sachsen-Anhalt), DEA (Nordrhein-Westfalen)

***Summary (native language):**

Der Report untergliedert sich in drei Teil: Im ersten Teil werden Strategien zur Bekämpfung von Läusen im Apfelanbau ohne nachweisbare Rückstände zur Ernte zusammengefasst. Der zweite Teil befasst sich mit ersten Ergebnissen zur Kontrolle bzw. Förderung von Schad- und Nutzinsekten durch angepasstes Mulchen von Obstanlagen und angrenzenden Bereichen. Im dritten Teil werden Erkenntnisse zum Populationsverlauf und Bekämpfungsversuche der Kirschessigfliege in Deutschland wiedergegeben.

Summary (english):

The report is divided into three parts: In the first part, strategies for aphid control in apple production without detectable residues at the time of harvest are summed up. The second part deals with initial results for the control and / or promotion of pests and beneficial insects through the adapted mulching of orchard alleyways and adjacent areas. In the third part, findings on the population dynamics and approaches to control *Drosophila suzukii* in Germany are given.

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. Etablierung eines europäischen Netzwerks, das sich auf den Obstsektor konzentriert.
2. Entwicklung und Umsetzung eines systemischen Ansatzes zur Sichtung und Zusammenstellung bestehenden wissenschaftlichen und praxisnahen Wissens.
3. Etablierung eines laufenden Dialogs mit relevanten politischen Gremien auf regionaler, nationaler und EU Ebene.
4. Ermittlung und Unterstützung neuer Forschungsschwerpunkte durch kontinuierliches Monitoring und Auswertung bestehender und neu entstehender Forschungs- und Innovationsaktivitäten.

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
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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[1]

Scanning report 1
Hinrich H. F. Holthusen, Obstbauversuchsanstalt Jork

Author: Hinrich H. F. Holthusen, ESTEBURG – Obstbauzentrum Jork, Dep. Plant Protection and Diagnostics, Email: Hinrich.Holthusen@lwk-niedersachsen.de, Tel.: +49-4162-6016-131

Country: Germany

NUTS 3 region(s)[2]: DE6 (Hamburg), DE8 (Mecklenburg-Vorpommern), DE9 (Niedersachsen), DEF0 (Schleswig-Holstein), DEE0 (Sachsen-Anhalt), DEA (Nordrhein-Westfalen)

WP no. and title: 3 – Reduction in pesticides residues

Date: 14-04-2017

Source materials and methodology

Aphid control in apple: residual free options. Reports on "Strategies to control rosy apple aphid in the Lower Elbe region" published in Mitteilungen des Obstbauversuchsrings des Alten Landes and "Bekämpfung der Grünen Läuse im Sommer" published in Obstbau were scanned. Strategies to control the rosy apple aphid (*Dysaphis plantaginea*) were developed not only to control rosy apple aphid, but also focus on protection of beneficial insects, control other pests the same time, and do not produce detectable residuals at harvest (Holthusen & Mohr, 2017). The control of green apple aphid (*Aphis pomi*) during summer becomes more challenging due to the lack of registrations of insecticides. Additionally, most registered products are harmful to beneficial insects during summer or produce detectable residuals at harvest. Insecticides registered for organic production often produced phytotoxicity, also (Trautmann, 2016).

Best practice findings

Abstract from Holthusen & Mohr (2017): Rosy apple aphid (*Dysaphis plantaginea*) is one of the most important pests in apple production, causing massive fruit damage due to sucking activity on the foliage. The economic threshold is at 1-2% infected shoots in spring. The present study was aimed at developing an effective strategy which would control the rosy apple aphid as well as other pests while being non-harmful to beneficial insects. To this end, 27 insecticide trials were conducted in open orchards. Overwintering females were controlled with Calypso at high efficacies (>95%) between the green-tip stage and the end of flowering. A comparison between different insecticides confirmed the high efficacies of Calypso and Teppeki. Mospilan SG or two applications of NeemAzal-T/S were slightly weaker, single applications of NeemAzal-T/S or Pirimor Granulat clearly less effective. Post-bloom applications were generally less effective, especially with Movento SC 100. The combination of a pre-bloom spray with Pirimor Granulat and a post-flowering treatment with Movento SC 100 gave nearly 100% efficacy in 2016. Such a long period of effective treatments enables farmers to adapt the timing of their sprays to the control of other pests such as neonicotinoids against the common green capsid, of Pirimor Granulat and Movento SC 100 against woolly aphid and other aphids. Importantly, the use of neonicotinoids harmful to beneficial insects after flowering can be avoided. Further, fruit from all but one of the tested spray strategies (Teppeki post-flowering) remained free from detectable insecticide residues at harvest. Therefore, all but one strategie (Teppki post-flowering) make a suitable contribution to residual free fruits. However, most of the strategies depend on the availability of suitable insecticides, which may not be the case in the medium-term future depending on registration.

Under special circumstances, the green apple aphid (*Aphis pomi*) must be controlled with insecticides after bloom. However, most likely Teppeki (flonicamid) will be the only synthetic insecticide registered against aphids in Germany in the future. Since Flonicamid produces detectable residues at harvest when applied post-bloom, residues free alternatives are needed. NeemAzal-T/S (azadirachtin) is not registered in post-bloom in Germany, beyond that also efficacy against green apple aphid in summer was unsatisfying. Neudosan Neu (potassium soap) showed no satisfactory results, also. In contrast, the green apple aphid was fairly well controlled with Spruzit Neu (pyrethine). Furthermore, aphids were well controlled by the application of Kaliseife Kokos (potassium soap with potassium cocoate), which unfortunately is not registered as an insecticide. NeemAzal-

[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

T/S and Spruzit Neu, both produced inadmissible phytotoxicity on apple leafs, which disqualify those produces for the use in commercial apple production. Information on phytotoxicity of potassium soaps is still missing (Trautmann, 2016).

Section C. Annex: Scanning report 2[3]

Scanning report 2
Hinrich H. F. Holthusen, Obstbauversuchsanstalt Jork

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Country: Germany

NUTS 3 region(s)[4]: DE6 (Hamburg), DE8 (Mecklenburg-Vorpommern), DE9 (Niedersachsen), DEF0 (Schleswig-Holstein), DEE0 (Sachsen-Anhalt), DEA (Nordrhein-Westfalen)

WP no. and title: 3 – Reduction in pesticides residues

Date: 14-04-2017

Source materials and methodology

Weed and alleyway mulching for pest control. Reports on "Control of *Lygocoris pabulinus* on apple by summer moving of herbaceous plant borders" and "Is the alternating mowing of orchard alleys an option to promote flowerbugs on pears?" published in Mitteilungen des Obstbauversuchsrings des Alten Landes were scanned. Mulching strategies during summer were tested to stop the larval development of the common green capsid by withdrawing the foodstuff (Mohr et al., 2016). Flowerbugs (*Anthocoris* spp.) are important antagonists of pear leaf suckers (*Cacopsylla pyri*). Since flowerbugs need protein-containing pollen as an alternative food source during early season, alternating mulching of alleyways to promote the development of flowering plants in the orchard was tested (Appel & Weber, 2017).

Best practice findings

Abstract from Mohr et al. (2016): the common green capsid (*Lygocoris pabulinus*) is currently the most important fruit-damaging shield bug in apple production in the Lower Elbe region. All registered insecticides have no or only limited efficacy. Therefore, we conducted trials in which herbaceous plant borders were mowed during the time of larval development of the second generation which takes place on these hosts. In all four trials a strong reduction of fruit damage was associated with the mowing of borders during the preceding summer compared to unmowed control plots. The implications of this finding for the complex orchard ecosystem and for new strategies of shield bug control are discussed. Results from Mohr et al. (2016) showed that mulching of borders during summer is a very effective strategy for insecticide free common green capsid control, however, most likely with negative effects on biodiversity of other insects such as dragon-flies associaceted with such herbaceous plant borders.

Abstract from Appel and Weber (2017): In a trial conducted in three pear orchards under organic and two under integrated pest management during the 2016 season, no effects of alternating *versus* complete mowing of alleys every 14 to 21 days on the population density of flowerbugs (*Anthocoris* spp.) was observed. These and other beneficial organisms were already present at sufficient numbers to act as antagonists of pear leaf suckers (*Cacopsylla pyri*) during the development of second-generation nymphs after flowering. Therefore, the use of non-harmful insecticides during the 2016 season is likely to have been more important than the alternating mowing of alleys. Only long-term studies can show whether this is a general trend in Northern Germany.

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

Section C. Annex: Scanning report 3[5]

Scanning report 3
Hinrich H. F. Holthusen, Obstbauversuchsanstalt Jork

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Country: Germany

NUTS 3 region(s)[6]: DE6 (Hamburg), DE8 (Mecklenburg-Vorpommern), DE9 (Niedersachsen), DEF0 (Schleswig-Holstein), DEE0 (Sachsen-Anhalt), DEA (Nordrhein-Westfalen)

WP no. and title: 3 – Reduction in pesticides residues

Date: 14-04-2017

Source materials and methodology

Population dynamic and alternative control of *Drosophila suzukii* in stone fruit. Reports on "*Drosophila suzukii* on stone fruit in the Lower Elbe region in 2016" published in Mitteilungen des Obstbauversuchsrings des Alten Landes and "Kirschessigfliegen-Bekämpfung mit „alternativen Mitteln"" published in Obstbau were scanned. An approach to determine the region wide occurrence of individual *D. suzukii* generations in advance was developed (Weber & Kockerols, 2016). A field experiment treating *D. suzukii* with non-synthetic agents in sour cherries gave unpleasant results (Fried & Schell, 2016).

Best practice findings

Abstract from Weber and Kockerols (2016): In 2016 spotted-wing drosophila (*Drosophila suzukii*) developed economically relevant infestations on cherries and plums in the Lower Elbe region in a similar manner as 2015. In both years the first two generations of *D. suzukii* on earlymaturing cherry cultivars were inconspicuous whereas strong third and fourth generations developed on the main varieties Kordia and Regina, opening up possibilities to determine precise dates of insecticide measures or fruit picking. Incipient oviposition on Kordia and Regina was predictable a few days in advance. On various plum cultivars the severity of *D. Suzukii* infestations correlated with fruit maturity and a variety-specific skin toughness. An early harvest in combination with a rapid cooling and a subsequent maturation in storage could become important in controlling spotted-wing drosophila on plums.
Region wide synconcy in *D. suzukii* generation development was observed in two consecutive years and may be used for precise prediction of critical infestation rates. Beginning with the third generation, *D. suzukii* formed critical population size in Northern Germany, responsible for yield losses in sweet cherries (Weber & Kockerols, 2016).

A field experiment with two non-synthetic agents against *D. suzukii* in sour cherries gave unpleasent results (Fried & Schell, 2016). Three treaments with 1,0 kg calcium oxide / ha or 0,132 l hemp oi l/ ha in a weekly internval until a week before harvest did not reduce the infestation rate of sour cherries with *D. suzukii* even though infestation rate in untreated control was only moderate. In comparison, efficacy of a strategy based on 1x 0,125 kg Mospilan SG followed by 2x 0,15 l Spintor / ha and meter crown height in a weekly interval gave 78% reduction of infestation rate. Without post-harvest washing fruits treated with calcium oxide (0,15%) were not marketable due to massive calcium debris on the surface (Fried & Schell, 2016).

Literature

Appel, A. & Weber, R. W. S. (2017). Ist alternierendes Mulchen der Fahrgassen eine Möglichkeit zur Förderung von Blumenwanzen an Birnen? *Mitteilungen des Obstbauversuchsringes des Alten Landes* 72(3): 85–89.
Fried, A. & Schell, E. (2016). Kirschessigfliegen-Bekämpfung mit „alternativen Mitteln". *Obstbau* 41(4): 218–220.
Holthusen, H. H. F. & Mohr, D. (2017). Strategien zur Bekämpfung der Mehligen Apfelblattlaus an der Niederelbe. *Mitteilungen des Obstbauversuchsringes des Alten Landes* 72(4): 107–113.

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

Mohr, D., Lindstaedt, J., Eckhoff, H. & Weber, R. W. S. (2016). Befallskontrolle der Grünen Futterwanze durch Ausmähen krautiger Pflanzen. *Mitteilungen des Obstbauversuchsringes des Alten Landes* 71(12): 335–340.

Trautmann, M. (2016). Bekämpfung von „GRÜNEN LÄUSEN“ im Sommer. Veränderungen stehen an! *Obstbau* 41(6): 343–347.

Weber, R. W. S. & Kockerols, M. (2016). Die Kirschessigfliege im Steinobst an der Niederelbe 2016. *Mitteilungen des Obstbauversuchsringes des Alten Landes* 71(11): 303–307.

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **Europees netwerk rond fruit**

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

***Author/native language editor:** Marcel Wenneker & Peter Frans de Jong, Wageningen Plant Research, Stichting Wageningen Research, marcel.wenneker@wur.nl, peterfrans.dejong@wur.nl; +31 488473745, +31 488473745

Section A. Summary for EIP dissemination

***Keywords:** epidemiology, postharvest, red currant

***Main geographical location:** NL 224 zuidwest Gelderland (Randwijk)

Other geographical locations: [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]

***Summary (native language):**

Residuen van gewasbeschermingsmiddelen op vruchten zijn in toenemende mate een probleem voor de afzet van kleinfruit. Door retailers worden steeds hogere eisen gesteld aan het aantal verschillende residuen dat mag worden aangetroffen en aan het residuniveau dat geaccepteerd wordt (bovenwettelijke eisen). Met name rode bessen zijn in de afgelopen jaren problemen ontstaan, omdat veel verschillende actieve stoffen in de residu-analyses worden teruggevonden, en de hoeveelheid residu soms de MRL-waarde nadert. Om aan de eisen van de retail te kunnen voldoen is het noodzakelijk dat het aantal stoffen dat bij residu-analyses wordt aangetoond vermindert én het residuniveau wordt verlaagd. Doel van het onderzoek is het opzetten en testen van strategieën om het aantal verschillende residuen en de residugehaltes op rode bes te verminderen.

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. Oprichten van een Europees netwerk rond fruit
2. Ontwikkelen en implementeren van een methode om lopend onderzoek en praktijkervaring te scannen en te nivelleren
3. Houden van een dialoog met relevante gezaghebbers op regionaal, nationaal en Europees niveau
4. Exploreren van nieuwe topics in onderzoek door het uitvoeren van een survey naar reeds opgedane kennis en lopend onderzoek omtrent nieuwe innovaties.

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
Marcel Wenneker, WR

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Country: The Netherlands

NUTS 3 region(s)[2]: 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]

WP no. and title: **3 – Reduction in pesticides residues**

Date: 26-06-2017

Source materials and methodology

Wageningen Plant Research (WPR) Randwijk (part of Wageningen UR) is a research station specialized in fruit growing and encompasses an experimental garden (pome fruit, stone fruit, and small fruits), and is located in Randwijk, near Wageningen. WPR-Randwijk with applied scientific research is dealing amongst others with sustainable fruit production themes. The scanning was focused on the reduction of pesticides on red currant.

The source materials for this scanning report are amongst others:

Wenneker, M., Steeg, van der P., 2014. Strategies for minimizing pesticide residues in red currant (Ribes rubrum). IOBC Working Group “Integrated Protection of Fruit Crops” – “Subgroup “Soft Fruits”. VIII Workshop Book of abstracts on Integrated Soft Fruit Production. Fondazione Edmund Mach Vigalzano di Pergine Valsugana (TN), 26-28 May 2014: p. 33.

Best practice findings

In the red currant production for long storage, the number of available plant protection products is relatively limited. The protection products are mainly used for fruit rot, mildew and aphids. It is sprayed (very) frequently in the maximum permitted number of applications. The problem is that unlike larger fruits, almost all of the protection products used are found in the residual analyzes. The aim of the research is to set up and test strategies to reduce the number of different residues and amount of residues on red currants. Virtually all of the products used are found in the residual analyzes. This causes problems with sales organisations regarding the number of substances and the level of the residues that are found. The results are within the legally standards, but retail uses stricter requirements.

Different strategies were divined together with growers. Less risky periods were divined (period after blossom until first colouring). During these periods no protection products were used. These strategies were then tested against the standard practical scheme.

[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

Tested Strategies

No.	Scheme	Protection products	Number of sprays
1	Reduced standard schema	3x Switch, 1x Teldor, 2x Rovral, 2x Captan	8
2	Strategy A	3x Switch, 4x Teldor	7
3	Strategy B	3x Switch, 2x Teldor	5
4	Strategy C	3x Switch, 4x Rovral	7
5	Strategy D	2x Signum, 4x Teldor	6
6	Intensive standard scheme	3x Switch, 4x Teldor, 5x Rovral, 2x Signum, 3x Captan	17

No negative effect on the quality and storability of the red currant was found with less active substances or less applications than practical schemes. With these strategies it is possible to reduce the number of applications from appr. 15 to 6, and the number of a.i. from 12 to 6.

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **[EUFRUIT: Xarxa europea per a la fruita**

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

***Author/native language editor:** Mr. Mariano Vilajeliu, IRTA-MAS BADIA, 17134 La Tallada d'Empordà,

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Section A. Summary for EIP dissemination

***Keywords:** biological control, oriental fruit moth, monitoring, residues removing

***Main geographical location:** ES 512 Girona, ES 513 Lleida (Lérida)

Other geographical locations: FR 8 Mediterranée

***Summary (native language):**

Es fa menció de tècniques innovadores en la producció de fruita orientades a prioritzar l'ús de mètodes alternatius que permetin reduir la dependència dels tractaments fitosanitaris i minimitzar els residus en la fruita.

Summary (english):

Several innovative technics of fruit production are described in order to give priority to alternative methods for achieving the reduction of the pesticide dependence and the residues minimization on fruit.

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. Constituir una xarxa europea del sector de la fruita
2. Desenvolupar i implementar un procediment sistemàtic per a conèixer i sintetitzar l'existent coneixement científic i pràctic
3. Establir un diàleg constant amb els interlocutors responsables de la EU, de les polítiques nacionals i regionals
4. Identificar, promoure i donar prioritat a les noves àrees de recerca mitjançant la monitorització i anàlisi de les activitats d'innovació actuals i a curt termini

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
[Mariano Vilajeliu, IRTA-MAS BADIA]

Author: [Mr. Mariano Vilajeliu, IRTA-MAS BADIA; mariano.vilajeliu@irta.cat, 34 972 78 02 75

Country: Spain (Catalonia)

NUTS 3 region(s)[2]: [ES 512 Girona)]

WP no. and title: [WP 3 Reduction in pesticide residues]

Date: [12-04-2017]

Source materials and methodology

The findings described are linked with present research activities on fruit plant protection carried out in the IRTA – Mas Badia Experimental Station located in Girona province.

Best practice findings

1. BIOLOGICAL CONTROL OF PEST ON NETTED APPLE ORCHARDS

   The main objective is to base the defence of pest fruit trees on biological control. Secondary aims are to promote the alternative methods to chemicals, to reduce pesticide treatments and residues on fruit, and preserve and increase biodiversity. The research work has been done on two apple orchards protected with hail nets in the upper part and also with side anti-insect nets. Target pests are aphids grey apple aphid (*Dysaphis plantaginea*), green aphid (*Aphis pomi*) and woolly apple aphid (*Eriosoma lanigerum)*.

   Some actions were done to provide conditions of biological control: Installation of refugees for predators (*Forfícula auricularia* and Arachnidae) and three releases of the coccinelidae *Adalia bipunctata*, *Hippodamia coccinelidae* i *Scymnus* sp provided by Biomip company, at the amount of 2000 individual per Ha in May splitted in three days and they were only scarcered refound along the season.

   Preliminary results showed that the rossy apple aphid was not at all controled and one insecticide had to be sprayed to avoid important damages on fruits in both orchards, while woolly apple aphid was treated in only one of them because of natural control provided by the *Aphelinus mali* parasitoid. Green aphid did not seriously affect the orchards and was not treated. Even important catches of Oriental Fruit Moth in one of the orchards, no damages were observed. No other pests were observed in both orchards throughout the season though mass trapping material for mediterranean fruit fly was instaled to avoid fruit damages.

   Additional autumn measures were adopted to avoid high rosy apple aphids populations of the next year: 2 Kaolin sprayings during the period of egg-laying and nets were kept closed until mid-December.

2. NEW ATRACTANT LURES FOR ORIENTAL FRUIT MOTH (*C. molesta*) IN MATING DISRUPTION APPLE ORCHARDS

   Oriental Fruit Moth is an emergent pest on apple and pear orchards in Girona province and also in other fruit areas. Now a days a lot of Girona commercial orchards should use mating disruption techniques and / or insecticide treatments to avoid fruit damages due to this pest.

[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

In areas where the mating disruption system is used, capture inhibition is strong so standar monitoring lures of Oriental Fruit Moth do not work properly and captures are, usually, very low. In this situation nobody may know which is the risk of suffering damages of Oriental Fruit Moth.

Throughout 2015 and 2016 a new attractant pheromone lure of Consep (USA) provided by Kenogard (Spanish company) for Oriental fruit moth has been compared with the standard lure of Pherocon (traditionally used in this area) for monitoring this pest in standard apple orchards, some of them under mating disruption system and some other without. The new monitoring lure of Oriental Fruit Moth captured quite more in both cases compared with the standard lure. This is an important innovative tool to know roughly the level of this pest population on the orchards, and consequently, the risk level of fruit damages. Some studies must be done in the next future to know the threshold for the level of captures of this new attractant lure.

3. RESIDUES REMOVING JUST AFTER FRIDGESTORE PERIOD

The most common strategies to avoid problems of fungus disease on fruit throughout the fridge store period consist on spraying fungicides before harvesting or bathing after harvesting. Both systems imply high risk of residues occurrence on fruit.

The main objective of this activity was to check how much could be possible the apple residues reduction after 6 month conservation under the ULO fridge store. The following products and procedure were used in the trial.

<table>
<tr><th>Thesis</th><th>Characteristics</th><th>Conditions</th></tr>
<tr><td>1. Water</td><td>Water tap</td><td rowspan="4">Shaking immersion during 5 minutes. Posterior rinse with water tap</td></tr>
<tr><td>2. Oxone (1 g/l water)</td><td rowspan="2">49,4% potasic monopersulfat, monopotàsic sulfat, potasic sulfat</td></tr>
<tr><td>3. Oxone (10 g/l water)</td></tr>
<tr><td>4. Electrolized water</td><td>pH=7,1. Redox= 875 mv, Cl=500 ppm</td></tr>
</table>

Multiresidues analysis of the apple samples showed traces of Boscalid and Piraclostrobin, (active ingredients of Bellis) which was sprayed at preharvest to avoid fruit postharvest diseases. Detected values were a lot less than legal MRL and cleaning methods used provided a reduction from 10% to 50% compared with non-treated fruit.

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **EUFRUIT: European Fruit Network, WP3 Reduktion von Pestizidrückständen**

***Project title (English):** **EUFRUIT: European Fruit Network, WP3 Reduction in pesticides residues**

***Author/native language editor:** Dr. Andreas Naef, Agroscope, Schloss 1, 8820 Wädenswil, Switzerland andreas.naef@agroscope.admin.ch,+41 58 460 62 57

Section A. Summary for EIP dissemination

***Keywords:** disease and pest modelling, monitoring, low-input trial, mating disruption, exclusion netting apple-breeding

***Main geographical location:** CH0 Schweiz/Suisse/Svizzera

Other geographical locations: CH011 Waadt, CH012 Wallis, CH021 Bern, CH022 Freiburg, CH023 Solothurn, CH024 Neuenburg,CH025 Jura, CH032 Basel-Landschaft, CH033 Aargau, CH040 Zürich, CH052 Schaffhausen, CH055 St. Gallen, CH056 Graubünden, CH057 Thurgau, CH061 Luzern, CH063 Schwyz, CH066 Zug, CH070 Tessin

***Summary (native language):**

Moderne integrierte Obstproduktionssysteme setzen zur Bekämpfung von Schädlingen, Krankheiten und Unkräutern vor allem auf selektive und nützlingsschonende Pflanzenschutzmittel. Dies bedingt den Einsatz einer grösseren Anzahl verschiedener Wirkstoffe, die als Rückstände auf den Früchten nachweisbar sein können. Konsumenten erwarten aber eine Reduktion des Pflanzenschutzmitteleinsatzes in der Landwirtschaft und idealerweise die Eliminierung von Rückständen der Pflanzenschutzmittel, um Auswirkungen auf die Umwelt und die Gesundheit zu minimieren. Grossverteiler haben dementsprechend Qualitätsmanagement-Systeme lanciert, um die Gesamtmenge an Rückständen und die Anzahl der verwendeten Pflanzenschutzmittel zu reduzieren. Agroscope hat bei Äpfeln in einem mehrjährigen Versuch die Möglichkeiten einer rückstandsfreien Produktion aus agronomischer und ökonomischer Sicht geprüft. Die Ergebnisse zeigen, dass die Produktion von rückstandsfreien Tafeläpfeln unter Schweizer Bedingungen möglich ist, wenn die Pflanzenschutzstrategie gegen Pilzkrankheiten angepasst wird und alternative Methoden wie Totaleinnetzung gegen Schädlinge, Verwirrungstechnik gegen den Apfelwickler (Cydia pomonella), Mulchen des Falllaubs zur Reduktion des Schorfinokulums (Venturia inaequalis) und moderne Lagerungstechniken eingesetzt werden. Mit der Umsetzung einer solchen Strategie in der Anbaupraxis liesse sich ein wichtiger Konsumentenwunsch erfüllen. Allerdings rentiert diese Strategie ohne Preisdifferenzierung gegenüber der integrierten Produktion ökonomisch bisher nicht. Forschung, Beratung und Produktion sind gefordert! Sie müssen gemeinsam Methoden für eine wirtschaftliche, umwelt- und konsumentenfreundliche Produktion von Qualitätsobst entwickeln.

Summary (english):

Integrated fruit production systems rely on pest, disease and weed control with specific pesticides, which spare beneficial organisms. This leads to crop protection strategies with a larger number of different pesticides. However, consumers demand a reduction of pesticide use in agriculture and ideally an elimination of pesticide residues in order to minimize the impact on the environment and on risk for human health. Wholesalers introduced quality management systems in order to reduce residues and the used plant protection products. Agroscope tested during several years from a technical and economic point of view a low residue strategy. The production of residue-free apples is possible under Swiss conditions if the crop protection strategy against fungal diseases is adapted and alternative measures such as insect exclusion netting, mating disruption against codling moth (Cydia pomonella), mulching with leaves to reduce scab (Venturia inaequalis) inoculum, and modern storage techniques are applied. The production of low-residue apples meets consumer demand, but the economic calculation showed that the low-residue strategy is not profitable without a price premium compared to integrated production. Research, advisory services and production are challenged to develop profitable eco- and consumer-friendly production systems for high quality fruits.

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. Gründung eines europäischen Netzwerks im Bereich des Fruchtsektors.
2. Entwicklung und Implementierung eines systematischen Ansatzes um bestehendes wissenschaftliches und praktisches Wissen abzufragen und zusammenzufassen.
3. Aufbau eines fortlaufenden Dialogs mit relevanten EU, nationalen und regionalen Interessensvertretern
4. Identifizierung und Unterstützung neuer Prioritätsbereiche durch kontinuierliches Monitoring und Analysieren bestehender und künftiger Forschungs- und Innovationsaktivitäten.

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
[Andreas Naef, Agroscope]

Author: Dr. Andreas Naef, Agroscope, Andreas.naef@agroscope.admin.ch,+41 58 460 62 57

Country: Switzerland

NUTS 3 region(s)[2]: CH0 Schweiz/Suisse/Svizzera

WP no. and title: 3 – Reduction in pesticides residues – pomefruits

Date: 09052017

Source materials and methodology

1) Decision support systems

Pome and stone fruits

Every second year, Agroscope, the Swiss centre for agricultural research, publishes recommendations for plant protection in commercial fruit production. For 2017, this booklet has been supplemented with an updated list of plant protection products (Kuske et al. 2017: Flugschrift Nr. 122 (Aktualisierte Beilage): Empfohlene Pflanzenschutzmittel für den Erwerbsobstbau). This document is used in practice as an independent guideline for selection of products.

Due to limited resources, Agroscope had to stop the weekly plant protection bulletin for fruit production. After intensive discussions with the fruit production sector, the Agroscope bulletin could be replaced with a joint bulletin of several regional advisory services, which are supported by Agroscope with three information meetings during the season.

Agroscope provides several webpages with disease and pest modelling and monitoring information:

www.agrometeo.ch (apple scab infection forcasting, wheater data, pest monitoring data, crop stage data)

www.sopra.ch (pest forecasting)

www.feuerbrand.ch (fireblight forcasting)

For apple scab, a new model for prediction of infections was implemented. Monitoring is mainly done by research farms and advisory services but rarely by producers.

2) Chemical strategies

Pome fruits

Agroscope started a low-input trial with scab sensitive and scab resistant apple varieties several years ago. Results are described in the general summary. In 2017, two new projects were started. An international project in the Lake of Constance region aiming to build up demonstration orchards with innovative plant protection strategies and a collaboration with the fruit trading company aiming to build up a network of farmers producing low-residue apples.

Stone fruits

Agroscope started a new trial to control Pseudomonas in cherries with a combination of chemical treatments with acid clay and Bion and non-chemical preventive measures such as white stem painting and summer pruning.

3) Bio-control

Pome fruits

Mating disruption against codling moth is used by about 50% of the apple growers of the Lake of Constance area. In 2017, Agroscope performs a test with aerosol emitters, which actively puff pheromone into the air. The combination of mating disruption and granulosis virus is mainly used by organic producers (about 10%).

Since streptomycin has been banned in Switzerland, many farmers are using a combination of biocontrol with yeasts (Blossom Protect), acid clay (Myco-Sin) and potassium aluminium sulphate (LMA) to control fireblight.

[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

4) Physical Barriers

Pome fruits

In 2005, Agroscope started trials with exclusion netting first on apples to control moths. The exclusion netting is used only by pioneers farmers and orchards next to extensively managed high stem trees to prevent bees, contaminated with fireblight bacteria, to enter the orchards.

Stone fruits

At the beginning, trials with exclusion netting on cherries were done to find an alternative to the withdrawn insecticide dimethoate used to control the cherry fruit fly. Despite of promising results, this method was rarely implemented by producers because of higher costs. Since 2015, the situation has completely changed. In table cherry production, exclusion netting is used in combination with spinosad treatments to reach a 100% control of spotted wing drosophila. However, a reduction of residues is questionable, because additional treatments against the new pest may result into additional residues.

5) Mechanisation

Pome and stone fruits

Mechanical thinning is used only by organic farmers but mechanical weeding is becoming more important in integrated production – mainly due to political pressure. In 2016 a demonstration day was used to show different machines available. In addition, a project has been started to test mechanical weeding in integrated cherry production.

6) Genetics

Pome fruits

The Agroscope apple-breeding program focusses on robust varieties. The most promising candidates from this program and from other breeders are tested under a standard IP plant protection strategy and a low input strategy with reduced use of synthetic pesticides.

Best practice findings

As described in 2016, the invasion of new pests and diseases such as the spotted wing drosophila and the withdrawal of pesticides like dimethoate and streptomycin and the first Swiss national action plan to reduce risk of pesticide use, becoming operative this year, have changed the mind of many producers and cooperatives. Cooperatives and regional advisory services intend to establish a net of demonstration farms with low-residue crop protection strategies. Researchers of Agroscope are involved as experts in these initiatives.

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **EUFRUIT: Europäisches Obst-Netzwerk**

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

***Author/native language editor:** Dr. Markus Kelderer, Laimburg Research Centre, Laimburg 6, 39040 Post Auer, BZ-Italia, Markus.Kelderer@laimburg.it, +390471969662

Section A. Summary for EIP dissemination

***Keywords:** Thematic Network, Fruit Sector, EUFRUIT,

Organic Farming, Plant Protection, Fertilization, Biocontrol, Crop Regulation

***Main geographical location:** ITH10 Bolzano-Bozen

Other geographical locations: ITH10 Bolzano-Bozen

***Summary (native language):**

Ein Schwerpunkt der angewandten Forschungen der Arbeitsgruppe für Ökologischen Anbau am Versuchszentrum Laimburg ist die Ertragsregulierung. In der Praxis haben sich die Schwefelkalkbrühe und die mechanische Blütenausdünnung durchgesetzt. Große Bedeutung haben auch die Versuche zur Regulierung der mehligen Apfelblattlaus mit standardisierten Niemextrakten. Nach wie vor stellen diese die einzige Möglichkeit dar, den Schlüsselschädling wirksam zu regulieren. In den 90er Jahren wurden außerdem die gezielten Schorfbehandlungen in der Keimfase der Sporen entwickelt. Erwähnenswert sind auch die Versuche zur gezielten Behandlung mit Schwefelkalk über die Oberkronenberegung. Sie ermöglicht Behandlungen während der Regenphasen in Steillagen, schont den Boden, reduziert die Rückstände, ist zeitsparend, schont die Nützlinge, bedingt durch das große Tropfenspektrum kann sie als abdriftmindernd eingestuft werden.

Was Versuche zu Rückständen anbelangt, sind Versuche zu Kupfer und Schwefel, K-Phosphit, Spinosad, abdriftmindernde Maßnahmen mit Kulturnetzen usw. von Bedeutung.

Eine Besonderheit stellt die Tätigkeit der Arbeitsgruppe zur Unkrautregulierung dar. Im Lauf der Jahre wurden immer wieder Neuentwicklungen der mechanischen und thermischen Unkrautregulierung getestet.

In den Südtiroler Anbaubedingungen wirkt sich eine gute Stickstoffversorgung rund um die Blüte positiv auf die Erträge aus. Diese kann über organische Handelsdünger mit abschätzbarem Mineralisierungverhalten sowohl im Herbst als auch im zeitigen Frühjahr erreicht werden kann. Weiters werden Versuche zur Bodenmüdigkeit durchgeführt und biotaugliche Maßnahmen dagegen getestet. Positive Ergebnisse konnten in vielen Fällen durch das Austauschen der Erde zwischen Reihe und Fahrgasse, dem Einsatz von Kompost, Einsaaten mit Kreuzblütlern, Solarisation, Dampfsterilisierung, Einsatz von mikrobiologischen Präparaten usw. erzielt werden. Vergleicht man allerdings die Kosten mit dem Nutzen konnte keine der Behandlung bisher wirklich begeistern.

Schwerpunkte der Forschung der letzten Jahre waren ebenfalls die Suche nach Alternativpräparaten zum Kupfer. Diesbezüglich muss erwähnt werden, dass außer einer eingeschränkten Empfehlung der Karbonate, nichts Neues sich in der Praxis durchsetzen konnte. Ein besonderes Augenmerk wurde diesbezüglich auch auf neue Krankheiten wie Alternaria und Marssonina gelegt.

Bei Versuchen zur Regulierung von Gleosporium auf anfälligen Sorten zeigen sich bei Einhalten des optimalen Erntetermins gute Ergebnisse mit sauren Tonerden in Freilang und/oder Warmwasserbehandlung vor der Einlagerung. Problematisch bleiben nach wie vor sehr spätreifende Sorten, für welche Versuche mit Regenabdeckungen durchgeführt wurden..

Versuche gegen die Obstmade mit verschiedenen Einnetzungsystemen zeigten bei mittlerem Druck gute Ergebnisse. In Befallslagen konnte sich allerdings nach einigen Jahre trotzdem ein starker Befall einstellen. Bei frühzeitigen Schließen konnte auch ein ertragsregulierender Effekt beobachtet werden.

Die Blutlaus ist trotz eines Jahrzehnts intensiver Forschung noch nicht gelöst. Diesbezüglich wird derzeit große Aufmerksamkeit auf die Sorten- und Unterlagenanfälligkeit gelegt. Überhaupt zeigt sich immer wieder wie wichtig eine Sortenprüfung unter Biobedingungen ist.

Neu eingeführt wurde in der Praxis des Südtiroler Ökoapfelanbaus die Förderung des Junifalls durch den Einsatz von Transpirationshemmern.

In Anlagen, die nicht mit Insektiziden behandelt werden, läuft derzeit ein Projekt zur Förderung der Nützlinge durch Einsaaten von Blühstreifen gegen mehlige Apfelblattlaus und Apfelwickler. Aus der Sicht des Obstbauers waren die Ergebnisse bisher enttäuschend.

Summary (english):

A focus of the applied research conducted by the working group for organic farming at Laimburg Research Centre is the crop regulation. In this context, lime sulphur application and the mechanical flower thinning asserted themselves over other methods that have been tested. In addition, the working group conducted experiments with neem extracts for the regulation of the rosy apple aphid, which represent the only possibility to control the pest effectively.

In the 90s, systematic treatments against scab during the germ-phase of the spores have been developed. Noteworthy is the scab treatment with lime sulphur through the overhead irrigation: this technique preserves the soil, reduces residues, saves time, and spares beneficial organisms. Additionally, it reduces driftage due to the large droplet spectrum.

Regarding residues, experiments with copper, sulphur, K-phosphite, spinosad, drift-reduction techniques with nets were conducted. Residues still continue to be an important research topic for the working group.

Importantly, the group tested new developments of the mechanic and thermal weed control.

The group works also on soil management and fertilization: With the cultivation conditions in South Tyrol, a good nitrogen supply during the blossom affects the yields positively. The good nitrogen supply can be achieved through commercial organic fertilizer with assessable mineralising characteristics in the autumn and early spring

Experiments with organic-suitable measurements against soil apple replant disease were conducted. In this context, the following cases reached positive results: the exchange of the soil of the planting row with the one of the alley, the application of compost, the sowing of cruciferous plants, solarisation, steam sterilization and microbiological compounds. However, if the costs of these techniques are looked at and compared to their effects, none of these treatments are convincing.

Another important focus is the search for alternatives to cupper. However, thus far no other compound, except for the limited introduction of carbonates, has been introduced. In this context, new diseases like alternaria and marssonina are central topics for the working group. So is the control of Gleosporium. Experiments led to the following results: if the time frame for harvesting was met, acidic clay achieved some good results, as did the hot water treatment before the storage. Problematic are late maturing varieties for which trials with rain covers are conducted.

Trials against the codling moth with different netting-systems led to positive results when medium pressure. However, areas with a heavy pressure of codling moth can still suffer an infestation a few years later. Additionally, the early closure of the nets led to yield regulating effects.

The problem of the woolly aphid has not been solved thus far. Currently, attention is given to the susceptibility of the varieties and rootstocks. In general, much importance is given to the variety-testing in organic conditions.

Lately, the promotion of the June fruit drop through the application of transpiration inhibitors is receiving more importance.

Currently, a project for the promotion of beneficial organisms against the codling moth and aphids with the sowing of flower strips is conducted. In the fields of this project, no insecticides are applied. For the producer, the results of these experiments have been quite disappointing thus far.

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. Errichtung eines europäischen Netzwerkes, welches sich auf den Obstsektor konzentriert
2. Entwicklung und Umsetzung einer systematischen Vorgehensweise zum Festhalten und Synthetisieren des bestehenden wissenschaftlichen und praktischen Wissens
3. Schaffen eines kontinuierlichen/anhaltenden Dialogs mit relevanten EU, nationalen, sowie regionalen politischen Körperschaften
4. Identifikation und Unterstützung von neuen prioritären Forschungsgebieten durch das kontinuierliche Monitoring und Analysieren von bestehender und aufkommender Forschung und Innovationsaktivitäten.

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
Markus Kelderer, Laimburg

Author: Dr. Markus Kelderer, Laimburg Research Centre, Markus.Kelderer@laimburg.it, +390471969662

Country: Italy

NUTS 3 region(s)[2]: ITH10 Bolzano-Bozen

WP no. and title: WP3, Reduction in pesticide residues

Date: 20/04/2017

Source materials and methodology

Serena Polverigiani, Markus Kelderer, Ewald Lardschneider and Davide Neri (2014)

Organic Wastes Use in Horticulture: Influences on Nutrient Supply and Apple Tree Growth. International Journal of Plant & Soil Science 3 (4) 358 - 371

M. Kelderer, E. Lardschneider, J. Telfser (2014)

Interaction between varierties, lime sulphur and hainet on the thinning effect and on side effects using paraffin oil as a June drop thinner. Proceedings of the 16th International Conference on Organic Fruit Growing, 132 -141

M. Kelderer, E. Lardschneider, A. Rainer (2014)

Crop regulation with single row netting structures and their influence on crop quality. Proceedings of the 16th International Conference on Organic Fruit Growing, 127 - 131

M. Kelderer, A. Topp, E. Lardschneider, A. Rainer, A. Matteazzi (2014)

Organic apple tree nutrition: Comparison of different organic fertilizers, application timing and rate, and soil management techniques: results of a 5 year field study. Proceedings of the 16th International Conference on Organic Fruit Growing, 116 - 126

H. Gruber, C. Casera, K. Marschall and M. Kelderer (2014)

Evaluation of the efficacy of plant protection products against *Marssonina* blotch. Proceedings of the 16th International Conference on Organic Fruit Growing, 90-95

Sonia Longo, Marina Mistretta, Maurizio Cellura, Markus Kelderer, Flavio Paoletti (2015)

Life Cycle Assessment of organic apple supply chain in the North of Italy. Proceedings of the International Conference on Life Cycle Assessment as reference methology for assessing supply chains and supporting global sustainability challenges. LCA for "Feeding the planet and energy for life". Stresa, 6th – 7th October 2015, Milano, Expo 2015, 8th October 2015, 246 - 249

E. Lardschneider, R. Schütz and M. Kelderer (2016)

Cultivar-specific adaptation of crop load regulation with transpiration inhibitors on the cultivars 'Gala', 'Braeburn' and 'Kanzi'®. Proceedings of the 15[7h] International Conference on Organic Fruit Growing, 116 -122

M. Kelderer, A. Topp and L. Manici (2016)

[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

Efficacy evaluation of steaming, plant extracts and composts in open field trials to reduce apple replant disease. Proceedings of the 17th International Conference on Organic Fruit Growing,103 - 107

M. Kelderer, E. Lardschneider and R. Schütz (2016)

Efficacy evaluation of different methods for the control of woolly apple aphid (*Eriosoma lanigerum* [Hausmann]) in organic apple growing. Proceedings of the 17th International Conference on Organic Fruit Growing, 77 – 84

Markus Kelderer, Ewald Lardschneider (2016)

Neue Wege für die Ertrags - regulierung im (Bio-) Apfelanbau. Besseres Obst, Heft 5/2016, 7 - 9

Best practice findings

A focus of the applied research conducted by the working group for organic farming of the Laimburg Research Centre (LRC) is on crop regulation. In the 90s, experiments regarding flower thinning with oils, soaps, vinasse or lime sulphur and the mechanical flower thinning were conducted. In practice, lime sulphur and the mechanical flower thinning asserted themselves over the other methods. Next to thinning techniques, experiments for the regulation of the rosy apple aphid with standardized neem extracts are important for the practice. Up till now, these extracts are the only possibility to control the pest effectively. Also in the 90s, systematic treatments against scab during the germ-phase of the spores have been developed. Worth mentioning are also the experiments for the scab treatment with lime sulphur through the overhead irrigation. This allows treatments during rain periods in steep slopes, preserves the soil, reduces residues, saves time, and spares beneficial organisms. Finally, this method reduces driftage due to the large droplet spectrum.

Residues of conventional and of organic compounds have been an issue for the working group over the years. In this context, the experiments with copper, sulphur, K-phosphite, spinosad, drift-reduction techniques with nets and others should be mentioned.

At the beginning of the new millennium, the working group conducted research regarding sanitary measurements against scab (removal of the leaf litter). This research, however, was not introduced into practice. Probably, the organic plots in South Tyrol are too little and scattered between conventionally cultivated surfaces: therefore, the spore-pressure is not high in many years.

The working group tested new developments of the mechanic and thermal weed control. In addition, the group tested eco-herbicides; the new regulations regarding organic farming 834/2007, however, limit these substances significantly.

Regarding soil management and fertilization, laboratory methods to test the mineralising characteristics of organic fertilizers were established. In addition, long-term fertilization trials with different fertilizers, application points, application rates of nitrogen, combined with soil management strategies were conducted. With the cultivation conditions in South Tyrol, a good nitrogen supply during the blossom affects the yields positively. The good nitrogen supply can be achieved through commercial organic fertilizer with assessable mineralising characteristics in the autumn and early spring.

In the past years, experiments with organic-suitable measurements against soil apple replant disease were conducted. In this context, positive results reached: the exchange of the soil of the planting row with the one of the alley, the application of compost, the sowing of cruciferous plants, solarisation, steam sterilization and microbiological compounds. However, if the costs of these techniques are looked at and compared to their effects, none of these treatments are convincing.

Another focus of the research in the past years was the search for alternatives to cupper. Thus far, no other compound, except for the limited introduction of carbonates, got accepted in practice. Here, attention is also being given to new diseases like alternaria and marssonina. Next to these, experiments for the control of Gleosporium with sensitive varieties led to the following results: if the time frame for harvesting was met, acidic clay achieved good results, as did the hot water treatment before storage. Problematic are late maturing varieties for which trials with rain covers are conducted. Trials against the codling moth with different netting-systems led to positive results when medium pressure. However, areas with a heavy pressure of codling moth can still suffer an infestation a few years later. Additionally, the early closure of the nets led to yield regulating effects.

The woolly aphid has been investigated intensively through pesticide testing and the application of beneficials during the season, plant protection application during the winter period, and pruning measures to reduce vigour of the trees. Yet, this problem has not been solved thus far. Here, attention is given to the susceptibility of the varieties and rootstocks. Generally,

importance is given to the variety-testing in organic conditions to realize the susceptibility of varieties, and to learn more about their sensitivity regarding active compounds approved in the organic production.

New in the practice of the South Tyrolean organic apple production is the promotion of the June fruit drop through the application of transpiration inhibitors (oily substances, which hamper the gas exchange). In this regard, many questions concerning varieties and external parameters are still open.

Currently, a project for the promotion of beneficials against the codling moth and aphids with the sowing of flower strips is conducted. In the fields of this project, no insecticides are applied. For the producer, the results of these experiments have been quite disappointing thus far.

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **EUFRUIT: RETEAUA EUROPEANA IN POMICULTURA**

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

***Author/native language editor:** Conf. Dr. Beatrice Michaela Iacomi, USAMV Bucureşti; Bd. Mărăşti 59, 011464 Bucureşti, sector 1, Romania; b.iacomi@yahoo.fr; 0727725167

Section A. Summary for EIP dissemination

***Keywords:** organic apple, pestes and diseases, Trichogramma evanescens, natural products

***Main geographical location:** RO321 Bucharest

Other geographical locations: 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

***Summary (native language):**

Sunt prezentate doua exemple legate de reducerea rezidiilor de persticide în fructele de măr: i) programul de protectie față de boli şi dăunători pentu o livadă ecologică de măr, bazat pe insecticide/repelenți pe bază de uleiuri minerale sau din plante şi fungicide pe bază de cupru, sulf şi extracte din plante; ii) posibilitatea reducerii numărului de tratamente insecticide care au ca țintă *Cydia pomonella* şi, implicit a reducerii poluării mediului prin aplicarea produslui Trichotim, care are ca ingredient activ viespea entomofagă *Trichogramma evanescens*.

Summary (english):

Two examples are presented as practice to minimize pesticide residues in apple fruits: i) pest and diseases protection program applied in an organic apple orchard, based on insecticide/repellents mineral or plant oils and sulfur, copper-based fungicides or natural fungicides as plant extracts; ii) the possibility of reducing the number of insecticides treatments for *Cydia pomonella*, and thus reducing environmental pollution through application of Trichotim, a bioproduct based on parasitic wasp, *Trichogramma evanescens.*

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. Realizarea unei rețele europene care are ca focus sectorul de fructe
2. Dezvoltarea şi implementarea unei abordări sistematice pentru scanarea şi sintetizarea cunoaşterii practice şi ştiinţifice existente
3. Stabilirea unui dialog continuu cu organisme recunoscute de politici europene, naţionale şi regionale
4. Identificarea şi sprijinirea unor noi domenii prioritare de cercetare prin monitorizarea continua şi analiza activităţilor de cercetare-inovare existente şi viitoare.

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.

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5. Stichting Wageningen Research (Netherlands) • WR
6. ~~East Malling Research (United Kingdom) • EMR~~ (terminated 08-02-2016)
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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
Iacomi Beatrice Michaela

Author: Iacomi Beatrice Michaela, USAMV Bucharest, b.iacomi@yahoo.fr; 0727725167

Country: Romania

NUTS 3 region(s)[2]: RO321 Bucharest

WP no. and title: WP3 Reduction in pesticide residues

Date: 10.04.2017

Source materials and methodology

The data are collected from research reports or database of research institutions and public institutions as Ministry of Agriculture and Rural Development (National Program of Rural Development). Unfortunately, there is a little or no readily available information with regard to the best practice applied in fruit orchards to minimize pesticides residues. When interviewed, growers indicated resistant varieties, cultural practices and reasonable pesticides treatments. There is still a lack of data on integrated or ecological apple production in different regions of Romania, no national statistics being presented/conducted. Furthermore, there is a lack of data shared by farmers on their personal technological program. In a research on internet, we have found some well known examples of ecological apple orchards in Romania.

Damianov S. Stef R., Grozea I., Vîrteiu A.M., Carabet A. 2014. Research concerning the biological control of codling moth (*Cydia pomonella*) using the entomophagous wasp *Trichogramma* sp. in the Caransebes pomicultural basin. 2014. *Research Journal of Agricultural Science*, 46 (1): 189-193
Mihele D., Stănică F. 2016. Establishing an organic apple orchard. Disertation.
(https://www.lumeasatului.ro/articole-revista/1154-lucrari-de-intretinere-intr-o-plantatie-ecologica.html).
(http://www.ebihoreanul.ro/stiri/ultima-or-31-6-20-41/eco-merita-cea-mai-mare-livada-de-mere-ecologice-din-romania-este-la-chersig-111270.html?mobile=no)
(*https://www.youtube.com/watch?v=yuVNkefEJF4*).

Best practice findings

Ongoing research

1. Case study: *Establishing an organic apple orchard*. USAMV Bucharest orchard. Mihele Dan, Florin Stănică (2016)
The biological material was represented by Topaz, Goldrush and Rubinola cultivars grafted on the rootstock M9 and René® Civren, Gemini Gaia Fujion, grafted onto rootstock M9 T337 Smeralda. The main diseases and pests which have been identified in apple orchard were: powdery mildew (*Podosphaera leucotricha*), brown rot (*Monilinia fructigena*), woolly apple aphid (*Eriosoma lanigerum*), green apple aphid (*Aphis pomi*), San José Scale (*Quadraspidiotus perniciosus*), and codling moth (*Cydia pomonella*). Pest and diseases management program was based on Ovipron (mineral oil), Oleorgan (Neem oil), Kabon (plant oils), Laser 240 SC (spinosad), Deffort (pest repelent) – as insecticides and Microthiol (sulphur 80%), Mimox (Mimosa tree bark extract), Bouillie bordelaise (copper) as fungicides. Pheromone traps (AtraPom) have been also installed for *Cydia pomonella*. Almost all apple growers used pheromone traps for monitoring and risk assessment of pests. So, the treshold is established and the decision to aplly treatments is made, with more effective pesticide application.

[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

2. **Case study. Biological control of codling moth (*Cydia pomonella*) using the entomophagous wasp *Trichogramma* evanescens** (Damianov et al., 2014)

Codling moth is the most destructive pests in apple orchards in Romania. Its alternative hosts can be pears, quinces and walnuts. The control of the codling moth can prove to be difficult due to the overlapping of its generations and the limited time when spraying can be applied, which is the period between the hatching of the maggots and their entrance into the fruit. Once the larvae have entered the fruit, control is not possible. Fortunately, there are a number of non-chemical methods available to control codling moth as mating disruption, habitat management and other measures to stimulation the growth of predator populations.

In the last few years, there has been significant increase of the attack by the codling moth in Western Romania. To reduce the population of this pest, we used the product Trichotim and *Trichogramma evanescens* as an active ingredient. Trichotim was applied 3 times on the two generations of the pest (2 applications in the first generation and 1 application in the second generation): applied rate of 300.000 wasps/ha, of which 250.000 wasps on the first generation and 50.000 wasps on the second generation. The entomophagous *Trichogramma* evanescens was launched two days after the flight peak of *Cydia pomonella*. The biological product Trichotim was applied with good results to control the two generations of codling moth. The efficacy and the increased yield recorded recommend the use of Trichotim as an IPM element in apple orchards. When applied at a rate of 300.000 wasps/ha, the product reduces with 4 the number of chemical treatments and, so, a reduction of environmental pollution on apple tree plantations of 25%.

Organic apple fruit orchards in Romania

1. *Proviva orchard*. At 25 km southeast of Satu Mare in Homodoru village, is the first certified organic orchard in the county, which belong to engineer Ioan Pop. The farm has a total area of 13.95 ha 4 ha are planted with apple. Speaking strictly about apple, the engineer Ioan Pop used varieties with high resistance to scab and powdery mildew: Florina, grown on 1.70 ha, Prima, Rawena and Remo. Although these cultivars have increased resistance to scab and powdery mildew, some preventive treatments are applied. The scheme differs from year to year. In the autumn, after falling leaves, trees are sprayed with a product based on copper. In winter or spring, a product based on oils is applied. In the spring, before flowering, if necessary, two treatments are applied, with copper products. During the growing season, Laser 240 SC and copper are applied (https://www.lumeasatului.ro/articole-revista/1154-lucrari-de-intretinere-intr-o-plantatie-ecologica.html).
2. *Cheresig orchard*. Constantin Demian is the manager of the biggest organic apple orchards of Bihor and Romania. Every orchard in Cheresig put up for sale "clean" apple as in grandparents times plus one tone of natural apple juice. He used as fertilizer manure or dolomite and insecticides are accepted if they are made of plant extracts (http://www.ebihoreanul.ro/stiri/ultima-or-31-6-20-41/eco-merita-cea-mai-mare-livada-de-mere-ecologice-din-romania-este-la-chersig-111270.html?mobile=no)
3. ***La Mosie orchard.*** Situated at a short drive from Bucharest, in Adunatii Copaceni, Giurgiu. The orchard coverd over 25 hectares whith over 10 different apple cultivars(Fuji, Golden, Granny Smith, Jona Gold, Braebum, De Costa and others). Fruits are delivereed to retailer and markets (*https://www.youtube.com/watch?v=yuVNkefEJF4*).

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **[**Europos sąjungos vaisių tinklas (EUFRUIT)**]**

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

***Author/native language editor:** [dr. Alma Valiuškaitė, senior researcher, Head of Plant Protection Laboratory, Institute of Horticulture LRCAF. email: a.valiuskaite@lsdi.lt; phone: + 370 37 55 52 17]

Section A. Summary for EIP dissemination

***Keywords:** [photosensitization, non-chemical methods]

***Main geographical location:** [LT002 Kauno apskritis]

Other geographical locations: 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]

***Summary (native language):**

Pastaruoju metu sodininkystėje ligoms ir kenkėjams kontroliuoti sunaudojami dideli pesticidų kiekiai. Tai nėra priimtina, nes didelis pesticidų naudojimas veda prie atsparumo. Turime skatinti naudoti biologinius produktus augalų apsaugoje. Fotosensibilizacija yra novatoriškas metodas, taikomas slopinti puvinių patogenams uogose, pagrįstas matomos šviesos (λ = 400 nm, 20 mW cm-2) ir fotojautrios medžiagos (chlorofilino darinio) sąveika. Fotosensibilizacijos privalumas tas, kad technologija neturėjo įtakos braškių uogų išvaizdai (spalvai, išvaizdai) bei maistinėms (fenoliams, antiocinianinams, antioksidantams) savybėms.

Labai svarbu vykdyti tyrimus ieškant naujų aplinkai draugiškų augalų apsaugos priemonių, bei pritaikyti mokslininkų tyrimus praktikoje.

Summary (english):

Significant amounts of pesticides are used for pest management in orchards all over the world. The inadequate usage of pesticides has become unacceptable because its leads to the resistance of pathogen. Biocontrol, the use of botanical extracts and other organic methods need to be strengthened.
New non-chemical food safety technologies reducing berry rots and extending storage time are new environment friendly tools. Photosensitization is an innovative method for inhibition of pathogens in berry and is based on the interaction of light (λ = 400 nm, 20 mW cm-2) and photoactive compound (chlorophyllin derivative). One of the main advantages of photosensitization is the absence of any harmful effects on antioxidant activity, total phenolics, anthocyanins or color with the significant extent of strawberry shelf-life of treated strawberries.
Therefore, it is necessary to encourage research into the effectiveness and practical application of environment friendly products for plant protection.

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), FR8Méditerranée;FR81 Languedoc-Roussillon,FR6 SUD-OUEST, FR512 Maine et Loire, FR611 Dordogne, FR812Gard, 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,DE128, 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; NL224zuidwestGelderland, NL 226Arnhem/Nijmegen, NL230 Flevoland,NL310 Utrecht,NL321 Kopvan Noord-Holland, Nl322 Alkmaar en omgeving, NL338oost Zuid-Holland,NL33Azuidoost Zuid-Holland,NL341Zeeuws-Vlaanderen, NL342overig Zeeland,Nl411west Noord-Brabant, NL413 noordoostNoord-Brabant, NL414 zuidoost Noord-Brabant, NL421 noord Limburg, NL422 Midden-Limburg, NL423zuidLimburg, ES620Murcia,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, ES618Sevilla, ES511 Barcelona, ES512 Gerona, ES513 Lérida, ES514 Tarragona,CH0 Schweiz/Suisse/Svizzera, ITH51-59 EmiliaRomagna 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. Sukurti Europos vaisių sektoriaus tinklą.
2. Parengti ir įgyvendinti mokslinių tyrimų ir praktinių žinių vieningą sklaidą.
3. Sukurti nuolatinį ryšį tarp atitinkamų ES, nacionalinių ir regioninių institucijų.
4. Nustatyti ir remti naujas prioritetines tyrimų sritis, nuolat stebėti ir analizuoti esamas bei būsimas mokslinių tyrimų ir inovacijų veiklas.

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
[dr. Alma Valiuškaitė LRCAF]

Author: [dr. Alma Valiuškaitė, senior researcher, Head of Plant Protection Laboratory, Institute of Horticulture LRCAF. email: a.valiuskaite@lsdi.lt; phone: + 370 37 55 52 17]

Country: [LITHUANIA]

NUTS 3 region(s)[2]: [LT002 - Kaunas apskritis]

WP no. and title: [WP no. **3 – Reduction in pesticides residues**]

Date: [11-04-2017]

Source materials and methodology

The chlorophyllin derivative (Chl) are used in post-harvest photosensitization on strawberry cv. 'Darselect'. Visually healthy fruits were soaked in Chl or water solution for 1 hour. After that fruits placed on a sterile tray in a chamber of LED-based light source and were exposed for 30 minutes (15 min one side and 15 min – the other side). LED-based prototype emitted light in the λ = 400 nm with the intensity of 20 mW cm-2 on the surface of fruits. The InGaN light emitting diodes in the prototype ranged from the top of the illumination chamber. After treatment, fruits were stored in a climate chamber KBF720 ("Binder", German) at a temperature of 5–7°C and assessed after 0, 2, 4, 6, 8 days of storage (Rasiukevičiūtė et al., 2015, 2016).

1. Rasiukevičiūtė N., Valiuškaitė A., Uselis N., Viškelis J., Luksiene Z., 2016. Attempts to use photosensitization for preservation of strawberry cultivar 'Darselect': effects on shelf-life, nutritional and organoleptic properties" excluding Photosensitization for preservation of strawberry. Journal of Plant Diseases and Protection, 123 (3): 125-131. Doi:10.1007/s41348-016-0020-5.
2. Rasiukevičiūtė N., Valiuškaitė A., Uselis N., Buskienė L. Viškelis J., Lukšienė Ž. 2015. New non-chemical postharvest techologies reducing berry contamination. Žemdirbytsė-Agriculture, 104(4): 411-416.

Best practice findings

Biocontrol, the use of botanical extracts and other organic methods need to be strengthened. Data obtained in our studies clearly indicate that photosensitization might be a useful tool to decontaminate strawberries from harmful microfungi distributed on the surface of the strawberry. These reductions are comparable to if not greater than reductions obtained by other methods. Photosensitization is an innovative method for eliminating fruit pathogens based on simultaneous use of light and a photosensitizer. One of the main advantages of photosensitization is the absence of any harmful effects on antioxidant activity, total phenolics, anthocyanins or color with the significant extent of strawberry shelf-life of treated strawberries. In addition, no negative impact on the taste of treated strawberries is possible to find, as visible light alone is not producing any effects, and chlorophyllin derivative (Chl) is a food additive. Chlorophyllin-photoactive compound is known as a photosensitizer, it is a water-soluble food additive (E140), and Chl is safe as well. This addresses to the understanding, that in some special cases, for instance, to increase the safety of ready to eat fruits, pastry-making products etc. photosensitization might be useful non-thermal and not chemical antimicrobial tool.

Reduction of the use of plant protection products in specific areas are one of the main topic. In order to reduce pesticides we have to control chemical products usage in home garden and public areas. Recent evidence suggests that side-effects of chemical control destroying natural flora and fauna; affecting water, soil and air; causing resistance to diseases and pests; and other factors have occurred since widespread usage of pesticides. The sustainable plant protection system protects the environment and gives an income of fruit-growers and takes care of farmers and consumers health. The traditional IPM is not so efficient comparing with sustainable plant protection system where is a reduced application. Only inspected plant protection product spraying equipment shall be authorized for professional PPP use. Plant protection product spraying equipment shall be inspected at five year intervals. In Lithuania, inspection of such equipment has been obligatory since 2001.

Integrated harmful organism management consists of monitoring and predicting harmful organisms, warning of possible harm, and selecting and applying control methods. Priority should be given to non-chemical methods of plant protection, and chemical plant protection products should be used only where other effective and economically appropriate alternatives are ineffective against harmful organisms. The use of biological plant protection products is also an integral part of integrated harmful

[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

organism management. The range of such products has been very limited to date. Therefore, it is necessary to encourage research into the effectiveness and practical application of environment friendly products for plant protection.

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **[EUFRUIT: Europäisches Obstnetzwerk]**

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

***Author/native language editor:** [Dr. Christian Scheer, Kompetenzzentrum Obstbau, Schuhmacherhof 6, 88213 Ravensburg, Deutschland; scheer@kob-bavendorf.de; 0049 751 7903 306].

Section A. Summary for EIP dissemination

***Keywords:** [keywords describing project and scanning report]

***Main geographical location:** [main location in at NUTS 3 level; see below, 'NUTS 3 region(s)']

Other geographical locations: [copy other NUTS 3 region from section C, below, 'NUTS 3 region(s)']

***Summary (native language):**

[space for short summary of scanning report in native language for EIP dissemination]

Summary (english):

[space for optional translation of the native language short summary of scanning report to English]

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):**

[Please translate project objectives, below, to native language]

1. Etablierung eines europäischen Netzwerks, das sich auf den Obstsektor konzentriert.
2. Entwicklung und Umsetzung eines systemischen Ansatzes zur Sichtung und Zusammenstellung bestehenden wissenschaftlichen und praxisnahen Wissens.
3. Etablierung eines laufenden Dialogs mit relevanten politischen Gremien auf regionaler, nationaler und EU Ebene.
4. Ermittlung und Unterstützung neuer Forschungsschwerpunkte durch kontinuierliches Monitoring und Auswertung bestehender und neu entstehender Forschungs- und Innovationsaktivitäten.

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
[Dr. Christian Scheer, Foundation KOB]

Author: [Dr. Christian Scheer, Kompetenzzentrum Obstbau, Schuhmacherhof 6, 88213 Ravensburg, Deutschland; scheer@kob-bavendorf.de; 0049 751 7903 306].

Country: Germany

NUTS 3 region(s)[2]: [code(s) and name(s)]

WP no. and title: **3 – Reduction in pesticides residues**

Date: [30.06.2017]

Source materials and methodology

- Focus on fungicide:
  - Long-term study since 2006
  - Adaption of the apple scab strategy
    - Field test of old and new products or combinations in the critical phase (bloom)
      - 36 trail members are tested
    - Apple scab trail in the secondary phase
      - Efficacy test of different products
    - Revision of last year trails e.g. the efficacy of Squall in combination with reduced amount of Delan
- Focus on herbicide:
  - Alternative test with rotary hoe
  - Testing of a new hot water method
  - Testing a method with pelargonic acid
  - Other fundamental test trails in the framework of an Interreg-project
- Conduct official plant protection product efficacy and crop safety studies for different arthropod pests and diseases
  - E.g. Codling moth, pear sucker, apple blossom weevil, spider mite, rust mite, summer fruit tortrix moth
  - E.g. with the sort Cameo tests on the susceptibility to neonectria and botrytis
  - E.g. tests of LMA and VP20 against fire blight
- Project management for Interreg Projects (Interreg V):
  - Development of practical control measures to minimise the economic damage from spotted wing drosophila. (01.04.2015 to 31.12.2018)
    - Laboratory studies (artifical rearing of flies)
    - Studies in semi-open field (artifical reared flies)
    - Studies in open field (natural population dynamics)
    - Open field pest monitoring
    - Biological studies (life cycle, population dynamics)
  - Low residue production: Model orchards to develop integrated plant production systems (1.12.2015 bis 31.12.2019)
    - Planting the model orchard (2ha) with Gala, Braeburn and Wellant
    - Installing of the net construction and water supply
    - Development of different test trails concerning the efficacy of nets and roofs
  - Cooperative work with the BLE-Projekt: Model and demonstration orchards (3 commerical apple orchards in the Lake Constance region), Data based development of application and evaluation methods to reduce the application of pesticides

[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

Best practice findings

The aim is to report about the best European practices to reduce pesticides residues on fruit.

- Evaluation of pesticide residues regarding the production method and development of a strategy (application timing) for use by fruit growers
- Work with fruit grower groups, application recommendations over the official pest and disease warning service, grower presentations
- Control of pests and diseases with alternative methods compared to the normally used sythetnic chemical active substances e.g. Codling moth granulosis virus and mating disruption (reduction in the number of synthetic chemical active substances from 4 to 1)
    - ¼ of fruit growers in the Lake Constance region using mating disruption
    - 96% of growers in the Lake Constance region using Codling moth granulosis virus
- Increased use of beneficial organisms e.g. though sowing flower meadows to increase biodiversity
    - 12% of growers promote biodiversity with sowing of flower meadows
- Control of apple scab supported by:
    - Leaf removal measures, measures to reduce infection carry over in autumn leaves
        - Calcium nitrate and urea applications before bud-break in spring (reduction in the number of perrithecia)
        - Reduction of leaves from the orchard in early spring before bud-break
        - ~30% of growers applying these measures
    - Application of lime-sulphur and calcium bicarbonate to reduce the number of synthetic chemical active substances to benefit organic chemical active substances
        - ~20% of growers using these products
- Use of sulphur to reduce the applications against rust mites
    - ~95% of growers using sulphur
- Encouragement of predatory mites for the control of spider mites
    - Through the use of active substance, that are safe to predatory mites
    - Active introduction of predatory mites for spider mite control in new orchard plantings
        - 100% of growers using these measurements
- Alternative methods to control cherry fruit flies in stone and berryfruit
    - Full net covering, partial net covering
        - ~80% of growers using these methods
- Monitoring of cherry fruit flies with apple vinegar / red wine traps
    - ~95% of growers using these monitoring methods
- Using of mechanical herbicide methods to reduce glyphosate
- Changeover of drift minimizing nozzles

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **[EUFRUIT: Network Europeo di Frutticoltura]**

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

***Author/native language editor:** [Dr Francesco Spinelli, Department of Agricultural Sciences, Alma Mater Studiorum - University of Bologna, viale Fanin 46, 40127 Bologna – Italy, Phone: +39 051 2096436; Email: Francesco.spinelli3@unibo.it]

Section A. Summary for EIP dissemination

***Keywords:** [minimal pesticides input, alternative control strategies, IPM, DSS and pest control]

***Main geographical location:** [ITH55]

Other geographical locations: [ITH51, ITH52, ITH53, ITH54, ITH56, ITH57, ITH58, ITH59]

***Summary (native language):**

Questo documento riporta una sintesi delle più moderne e sostenibili strategie per minimizzare l'uso di pesticidi in frutticoltura.

Summary (english):

[space for optional translation of the native language short summary of scanning report to English]

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):**

[Please translate project objectives, below, to native language]

1. Sviluppare una Rete Europea del settore frutticolo
2. Sviluppare e rafforzare un approccio di sistema per la sintesi e disseminazione dei risultati scientifici ai principali attori della filiera frutticola
3. Creare una rete per la discussione tra il mondo scientifico, la filiera produttiva e gli organi legislativi nazionali e regionali
4. Identificazione e promozione delle aree di ricerca prioritarie tramite il costante e capillare monitoraggio dell'offerta di ricerca e innovazione a livello Europeo

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
[Francesco Spinelli, UNIBO]

Author: [Dr Francesco Spinelli, Department of Agricultural Sciences, Alma Mater Studiorum -University of Bologna, viale Fanin 46, 40127 Bologna – Italy, Phone: +39 051 2096436; Email: Francesco.spinelli3@unibo.it]]

Country: [Italy]

NUTS 3 region(s)[2]: [ITH51, ITH52, ITH53, ITH54, ITH55, ITH56, ITH57, ITH58, ITH59]

WP no. and title: [WP3 - Reduction in pesticide residues]

Date: [14-07-2017]

Source materials and methodology

[I am leading the working package on "Practical Solution for Control" inside the FP7 project DROPSA "Strategies to develop effective, innovative and practical approaches to protect major European fruit crops from pests and pathogens" (Grant Agreement: 613678). I was also UNIBO principal investigator for the FP6 project QDETECT: "Developing quarantine pest detection methods for use by National Plant Protection Organizations (NPPO) and inspection services" (Grant Agreement: 245047). The participation to these projects allowed a constant update of the most effective and innovative control strategies. Moreover, in cooperation with the Technical University of Munich, we created and coordinate the "HortAlliance", a group of stakeholders and academic bodies. The group have constant information exchanges with the major fruit growers' association. Other updates have been obtained by the participation to scientific meeting and symposia and extension workshops both at national and international level. Extensive bibliographic researches have been performed on the major online databases.The following databases were consulted (alphabetically listed):CABI: https://www.cabdirect.org/?target=%2fcabdirect%2fsearch ;- Google Scholar: https://scholar.google.com/; ISI-WOS: www.webofknowledge.com; JSTOR: https://www.jstor.org/; ORCID: https://orcid.org/, PUBMED: https://www.ncbi.nlm.nih.gov/pubmed?otool=iitamsublib; SCOPUS: https://www.scopus.com/Best practice findings

Best practice findings

Physical barriers such as plastic tunnel or nets have been widely used in horticultural crops and are, nowadays, an increasing practice also in fruticulture. The cultivation under plastic tunnels and nets can greatly reduce the use of pesticide in fruit crops since this methods allow the physical exclusion of pest and disease from the orchard. Moreover, these practices are especially important for those pest and diseases causing damages during fruit development, when any chemical application may results in residues in fruits. However, the mechanisms underlying the efficacy of these physical methods are very complex and encompass the simple exclusion of pests and diseases. Plastic tunnel, in fact also influence the micro-climatic conditions inside orchards and the tree or vine canopy are critical factors in determining the local severity and extent of the diseases. A number of studies carried on cherry, yellow fleshed kiwifruit, apple and pear and grapes demonstrates that protected cultivation modifies temperature, relative humidity and light quality and intensity. Both plastic films and nets also reduces the leaf wetness which is a key parameter influencing pathogen ability to grow on the plant and cause infection. Among these conditions, the effect of light quality and intensity has received, so far, little attention. Light intensity and quality are crucial factor influencing plant development and physiological response against pest and pathogen, but they may also affect movement, survival and virulence of the pathogenic agents. Indeed, light quality, which is modified under coloured plastic film and nets is perceived by pathogens influencing their virulence, by pest modifying the visual clues by mean they choose fruits or plants and by the host plant modifying callose formation, expression of defense related genes and phenolic compound accumulation. The methods also reduce the number of possible entry point of the pathogen by minimizing the damages and bruised caused on the plants by climatic factors such wind, heavy rain or hail. Finally, the use of these physical barriers increases the permanence of control treatments, such as copper application, on the leaves.

[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

Example of successful practical applications of nets and tunnel are registered on pear for the control of *Carpocapsa*; grapes, cherry and stone fruit for the control of *Drososphila suzukii*; apple, pears and stone fruits for the control of *Halyomorpha alys* and on kiwifruit for the control of *Pseudomonas syringae* pv. *actnidiae*

Section C. Annex: Scanning report[3]

Scanning report
[Francesco Spinelli, UNIBO]

Author: [Dr Francesco Spinelli, Department of Agricultural Sciences, Alma Mater Studiorum -University of Bologna, viale Fanin 46, 40127 Bologna – Italy, Phone: +39 051 2096436; Email: Francesco.spinelli3@unibo.it]]

Country: [Italy]

NUTS 3 region(s)[4]: [ITH51, ITH52, ITH53, ITH54, ITH55, ITH56, ITH57, ITH58, ITH59]

WP no. and title: [WP3 - Reduction in pesticide residues]

Date: [14-07-2017]

Source materials and methodology

[I am leading the working package on "Practical Solution for Control" inside the FP7 project DROPSA "Strategies to develop effective, innovative and practical approaches to protect major European fruit crops from pests and pathogens" (Grant Agreement: 613678). I was also UNIBO principal investigator for the FP6 project QDETECT: "Developing quarantine pest detection methods for use by National Plant Protection Organizations (NPPO) and inspection services" (Grant Agreement: 245047). The participation to these projects allowed a constant update of the most effective and innovative control strategies. Moreover, in cooperation with the Technical University of Munich, we created and coordinate the "HortAlliance", a group of stakeholders and academic bodies. The group have constant information exchanges with the major fruit growers' association. Other updates have been obtained by the participation to scientific meeting and symposia and extension workshops both at national and international level. Extensive bibliographic researches have been performed on the major online databases.The following databases were consulted (alphabetically listed):CABI: https://www.cabdirect.org/?target=%2fcabdirect%2fsearch ;- Google Scholar: https://scholar.google.com/; ISI-WOS: www.webofknowledge.com; JSTOR: https://www.jstor.org/; ORCID: https://orcid.org/, PUBMED: https://www.ncbi.nlm.nih.gov/pubmed?otool=iitamsublib; SCOPUS: https://www.scopus.com/Best practice findings

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

Best practice findings

The modern holistic view on fruit quality is that it should not only have a nutraceutical value, but should also be free from contaminants such as pesticide residues, achieved through ensuring agricultural practices that reduce pesticide impacts on the environment and promote biodiversity. To achieve this aim, a key step is the adoption of efficient agricultural practices aiming on one hand to obtain high production of quality fruits and on the other in reducing disease development. Indeed, the cultural management is an indispensable component of an efficient disease control strategies. Recently, several studies provided an in-depth understating of the influence of agricultural practices on disease development and spread. Therefore, the role of pollination and the most important cultural management techniques, such as irrigation, fertilization, use of bio-regulators and pruning on the incidence and epidemiology of sieases were examined. All of these cultural management practices, affecting the plant vegetative and reproductive performances, are exploited to force productivity, at the expense of other physiological investigate the influence of agricultural practices on host susceptibility and disease development. The information gathered in this trials allowed to design the successive field trials that were performed under natural infection.

From a "multitasking" approach it was observed that contamination during the pruning and nitrogen nutrition (dose and form) are the most critical points in field management, influencing the infection process and promoting the spread of disease from infected to healthy plants. The vegetative-productive balance is difficult to determine, but it is the most important factor to influence the susceptibility of fruit trees to disease. For an agronomical control of disease, avoid all kind of excess, that can make plant more efficient from the agronomic point of view, but also more vulnerable to bacterial canker, is necessary.

IPM strategies harmonizing control methods and cultural management have been developed for cherry and grapes against *Drososphila suzukii* and they include clean harvest strategies, fruit removal, edge rows management and use of consociation (e.g. soya beans) inside the orchards. Extensive studies have also been conducted on kiwifruit and *Pseudomonas syringae* pv. *actnidiae* (http://content.iospress.com/articles/journal-of-berry-research/jbr115).

Moreover, the IPM strategies also included DSS systems allowing to tailor the agriculture management and the control inputs on plant phenological stage and susceptibility, forecasting risk models and risk maps (including CLIMAX models) and early diagnosis of the diseases on asymptomatic materials. Concerning the latter, mass trapping is widely used to monitor pest diffusion such as in the case of *Drososphila suzukii* via DroskiDrink trap. Also bio-VOCs monitoring for diagnosis (e.g. e-nose) has been used for early diagnosis in apple, pear (*Erwinia amylovora*, fire blight) and grapes (*Agrobacterium tumefaciens*). Other early diagnostic methods currently deployed are based on LAMP technology. LAMP diagnostic kit allows a very quick and rather inexpensive in field diagnosis on plant diseases. LAMP diagnostic tools have been developed and validated for PPV (Sharka) on stone fruits and for (*Erwinia amylovora* on pome fruits

Section C. Annex: Scanning report[5]

Scanning report
[Francesco Spinelli, UNIBO]

Author: [Dr Francesco Spinelli, Department of Agricultural Sciences, Alma Mater Studiorum -University of Bologna, viale Fanin 46, 40127 Bologna – Italy, Phone: +39 051 2096436; Email: Francesco.spinelli3@unibo.it]]

Country: [Italy]

NUTS 3 region(s)[6]: [ITH51, ITH52, ITH53, ITH54, ITH55, ITH56, ITH57, ITH58, ITH59]

WP no. and title: [WP3 – Reduction in pesticide residues]

Date: [14-07-2017]

Source materials and methodology

I am leading the working package on "Practical Solution for Control" inside the FP7 project DROPSA "Strategies to develop effective, innovative and practical approaches to protect major European fruit crops from pests and pathogens" (Grant Agreement: 613678). I was also UNIBO principal investigator for the FP6 project QDETECT: "Developing quarantine pest detection methods for use by National Plant Protection Organizations (NPPO) and inspection services" (Grant Agreement: 245047). The participation to these projects allowed a constant update of the most effective and innovative control strategies. Moreover, in cooperation with the Technical University of Munich, we created and coordinate the "HortAlliance", a group of stakeholders and academic bodies. The group have constant information exchanges with the major fruit growers' association. Other updates have been obtained by the participation to scientific meeting and symposia and extension workshops both at national and international level. Extensive bibliographic researches have been performed on the major online databases.

The following databases were consulted (alphabetically listed):CABI: https://www.cabdirect.org/?target=%2fcabdirect%2fsearch ;- Google Scholar: https://scholar.google.com/; ISI-WOS: www.webofknowledge.com; JSTOR: https://www.jstor.org/; ORCID: https://orcid.org/, PUBMED: https://www.ncbi.nlm.nih.gov/pubmed?otool=iitamsublib; SCOPUS: https://www.scopus.com/Best practice findings

Best practice findings

Biological control of plant diseases by the use of microorganisms antagonistic to pathogen is a widely diffied control method of fruit crop diseases. The main advantage of biocontrol is the reduction of xenobiotic pesticides, the lack of residues in fruits and the minimization of the risk of development of resistance among pathogen population.

Biological control agents (BCA) against fire blight of pome fruits (*Erwinia amylovora*), *Xanthomonas* of stone fruits and strawberry and *Pseudomonas* diseases in apple and kiwifruit are commercially available. The most diffused products are based on bacterial antagonists, but they also include lytic bacteriophages that are effective against citrus canker.

BCA have different mode of action such as competitive exclusion of the pathogen, production of antimicrobial compounds such as cyclolipopeptides in *Bacillus spp.*, phenolics in *Pseudomonas fluorescens*, and pseudopeptides in *Pantoea agglomerans* and *Pantoea vagans.* Other mode of action relies on interferences on pathogen signalling system or induction of plant resistance against diseases. The latter mode of action is exploited by *Trichoderma harzianum* and plant growth promoting rhizobacteria (PGPR), which are control methods, widely used to increase fruit crop defences and fitness.

Lactic acid bacteria are very promising BCAs known to have no environmental and consumers' concerns because they are already used as food additives to control food-borne pathogenic bacteria in fresh fruit and vegetables. Lactic acid bacteria effective again *Erwinia amylovora*, *Xanthomonas arboricola* and *Pseudomonas syringae* pv. *actnidiae have* already been identified and tested.

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

Nowadays a number of BCAs is also depoyed for the control of pests, being *Bacillus thuringiensis* (Bt) the most studied entomopathogenic species. More recently, other entomopathogenic bacteria, such as *Serratia* spp, *Pseudomonas entomophila*, *Burkholderia* spp., *Chromobacterium*, *Xenorhabdus* and *Photorhabdus* spp. have been studied for the pratical conrol of different pest. *Photorhabdus luminescens*, a Gammaproteobacteria, is a gram-negative and mutualistic bacterium that lives in the gut of entomopathogenic nematodes belonging to the *Heterorhabditidae* family. Both *P. luminescens* alone and its symbiotic *Heterorhabditis* spp. nematode are known to be highly pathogenic to insects. *Photorhabdus luminescens* has been succesfully used to control *Drososphila suzukii* in cherry. Another entomopathogenic microorganism widely used *Metarhizium anisopliae* that has the advantage of shwoing a very limited activity against useful insects such as pollinators. In fact, this fungus can even be used to control Varroa in beehives

As far is concerned the traditional biological control of pest of fruits trees, three different approaches exist. In a classical biological control program, the potential of parasitoids to control the pest is used. In augmentative biological control, the regular release of natural enemies is used for temporary control of the pest. Conservation biological control includes all methods that enhance the effect of natural enemies already present in the natural environment.

Biocontrol of pest is standard practice of controlling infestation in IMP strategies. Nonetheless, no biocontrol method is yet available for the two most important emerging pests such as *Drososphila suzukii* and *Halyomorpha alys*. Understanding the natural enemy complex and other biotic factors that cause mortality in these two pests is clearly essential for the development of biological control and IPM. Unsurprisingly, little is known on the natural enemies of these two pests in Europe, other than in laboratory tests which have shown that *D. suzukii* is resistant to most known European parasitoids of Drosophilidae, except the most polyphagous species. Many studies are now focusing on these aspects.

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **[EUFRUIT: Réseau thématique européen sur les fruits]**

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

***Author/native language editor:** [Penvern Servane, UR 0767 Ecodéveloppement, INRA PACA, Site Agroparc, 228 route de l'Aérodrome CS 40509, 84914 Avignon cedex 9, servane.penvern@inra.fr, 0033432722574]

Section A. Summary for EIP dissemination

***Keywords:** [apple orchards, system approach, organic, low-input, longitudinal survey, decision rule, multicriteria evaluation]

***Main geographical location:** [FR713 Drôme']

Other geographical locations: [copy other NUTS 3 region from section C, below, 'NUTS 3 region(s)']

***Summary (native language):**

Le dispositif BioREco est la première expérimentation système en arboriculture implantée en France. Ce dispositif a permis d'explorer dans la durée (2005-2015) le potentiel de réduction de l'utilisation des pesticides en verger de pommiers. Trois systèmes (Raisonné, RAI ; Econome en intrants, ECO ; Agriculture Biologique, BIO) ont été expérimentés, et trois variétés de sensibilité différente aux maladies (Smoothee, qui est un type Golden, Ariane et Melrose) ont été implantées dans chacun des systèmes, soit 9 parcelles au total.

Par rapport à la référence régionale, il a été possible de réduire l'utilisation des pesticides en moyenne de 38 à 45% en combinant variété peu sensible ou résistante aux maladies, un ensemble de pratiques alternatives aux pesticides et une évaluation fine du risque de dégâts. Cette réduction a été atteinte pour des niveaux de rendement similaires en ECO et RAI. Le rendement a été moindre dans le système BIO dans lequel les dégâts sur fruits peuvent être plus élevés. L'abondance et la diversité des communautés biologiques étudiées (lombrics, forficules, araignées) varient selon les systèmes et les années. A l'échelle globale, l'impact environnemental des systèmes est diminué par la réduction de l'utilisation des pesticides. Les coûts de production sont plus élevés en ECO et BIO par rapport à RAI, mais sans revalorisation du prix des fruits en ECO. Le système ECO requiert enfin un contexte et un accès à l'information spécifiques pour sa mise en œuvre.

Cette évaluation multicritère a permis le développement d'outils d'évaluation et d'identifier les points forts et les points d'amélioration des systèmes expérimentés. Ce dispositif a également permis de créer une dynamique autour de l'approche expérimentale, des vergers, de leur évaluation multicritère, des résultats et des connaissances nécessaires pour repenser les vergers de demain.

Summary (english):

The BioREco experimental design is the first system experimented in fruit tree production planted in France. This system has made it possible to explore over the long term (2005-2015) the potential to reduce the use of pesticides in apple orchards. Three systems (Conventional, CON; Low Input, LI; Organic, ORG) have been tested with three apple cultivars differing in disease susceptibility (Smoothee, a Golden Delicious type cultivar susceptible to scab; Ariane, a scab-resistant cultivar; and Melrose, a low-susceptibility cultivar) that were implemented in each of the systems, i.e. 9 plots in total.

Compared to the regional reference, it was possible to reduce the use of pesticides by an average of 38 to 45% by combining a low-susceptible or disease-resistant cultivar, a set of alternatives to pesticides and an acute assessment of the risk of fruit damage. This reduction was achieved for similar yield levels in LI and CON systems. The yield was lower in the ORG system where fruit damage may be higher. The abundance and diversity of the studied biological communities (earthworms, earwigs, spiders) varied depending on the system and year. On a global scale, the environmental impact of the systems was reduced by decreasing the use of pesticides. Production costs were higher in LI and ORG than in CON systems, but without price premium in LI. Finally, the LI system required a specific context and access to information for its implementation.

This multi-criteria evaluation enabled the development of evaluation tools and the identification of the strengths and improvement points of the experimented systems. This experimental design also helped to create a dynamic around the experimental approach, the orchards, their multicriteria evaluation, the results and the knowledge necessary to rethink the orchards of tomorrow.

Section B. Project information

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***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. Créer un réseau européen sur le secteur des fruits
2. Développer et mettre en place une approche systémique pour le recensement et la synthèse de connaissances pratiques et scientifiques existantes
3. Mettre en place un dialogue avec les instances politiques européennes, nationales et régionales pertinentes
4. Identifier et promouvoir de nouvelles thématiques de recherche grâce à une veille et une analyse des activités de recherche et d'innovation existantes et à venir

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
[Servane Penvern, INRA]

Author: [Penvern Servane, UR 0767 Ecodéveloppement, INRA PACA, Site Agroparc, 228 route de l'Aérodrome CS 40509, 84914 Avignon cedex 9, servane.penvern@inra.fr, 0033432722574]

Country: [France]

NUTS 3 region(s)[2]: [FR713]

WP no. and title: [WP3]

Date: [08/05/2017]

Source materials and methodology

We selected research results related to a long-term systemic experimentation that compared three systems relatively close to existing orchards where multiple alternative practices were combined in order to reduce pesticide use and assessed in a multi-criteria approach. This case study is also relevant because it produced numerous communication materials including scientific publication of high quality, a 8-page synthesis to emphasize main results and to ease reading, and a set of 5 short films on the project, the approach, the experimented systems, the specificities of the fruit agroecosystem, and the evaluation step. This 8-page document syntheses the results obtained over 12 years of experimentation. It is in French but could easily be translated into English. We think this long term systemic experimentation is exemplary for EUFRUIT because it is close to farmer's reality who combines multiple techniques to control a set of pests and diseases and face inter-annual variability. Those results have however to be taken with caution since they are site specific, which limits further applications. It could then be worth comparing these results with others from similar experimentations in other sites.

List of attached documents:

Synthetic leaflets of the assessment results in French: BioREco, 12 ans d'expérimentation" ; Inra Gotheron, janvier 2017, 8 pages.

Scientific publications in English:

Simon S, Brun L, Guinaudeau J, Sauphanor B (2011) Pesticide use in current and innovative apple orchard systems. Agro. Sust. Dev., 31, 541–555

Alaphilippe A., Simon S., Brun L., Hayer F., Gaillard G. (2013). Life cycle analysis reveals higher agroecological benefits of organic and low-input apple production. Agro. Sust. Dev., 33, 581-592

Simon S. et al. (2017) Methodology to design agroecological orchards: Learnings from on-station and on-farm experiences. Europ. J. Agronomy, 82, 320–330

Web pages:

A short film in French that describes the project already online: http://mediatheque.inra.fr/media/detail/339416/private

Best practice findings

The present systemic approach was thus successful in evaluating the level of pesticide use reduction enabled by the integration of presently available tools to control pests and diseases within current straight-designed mono-clone orchards and for current fruit marketing standards.

1-Combined levers to reduce the use of pesticides.

More or less integrated according to the systems, the levers to limit the use of pesticides comprised:

[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

- plant-mediated actions (cultivar choice, tree training for aerated canopy, fertilization and irrigation adjusted to the needs of the trees)
- sanitation practices (to control scab, codling moth, powdery mildew)
- natural enemy-mediated actions through the use of selective pesticides, reducing the frequency of mowing in the orchard alleys
- an acute assessment of the risk of fruit damage in the plot based on forecasts and meteorological conditions, observations in orchards and the use of models of prediction of the risk of damage (scab, codling moth)
- alternative methods to synthetic pesticides: mechanical weeding, mating disruption, microbiological control (codling moth granulosis virus), biological control (entomopathogenic nematodes).

2- The reduction of pesticides was assessed by measuring the decrease in the Treatment Frequency Index* compared to the regional reference:

- The systems that permitted the most significant pesticide use reduction (38-45% on average compared to CON planted with Smoothee) were those that combine a disease low-susceptibility or resistant cultivar, a set of alternative methods to chemicals and an acute prediction of the risk of fruit damage.
- The decrease in pesticide use remained limited (<25%) in ORG and LI for disease-susceptible cultivar such as Smoothee.
- When the system mainly relied on chemical solutions (no risk taking), the reduction in the use of pesticides was also limited whatever the cultivar (<25%, eg CON).
- The use of mating disruption, which has become widespread in production orchards, has also been implemented in the CON system from 2013 onwards. It permitted on average a decrease of 6.2 insecticide TFI.

3-Overall conclusions.

Three systems (Conventional, CON; Low Input, LI; Organic, ORG) were tested. Compared to the regional reference, it was possible to reduce the use of pesticides by an average of 38 to 45% by combining a low-susceptible or disease-resistant cultivar, a set of alternatives to pesticides and an acute assessment of the risk of fruit damage. This reduction was achieved for similar yield levels in LI and CON systems. The yield was lower in the ORG system where fruit damage may be higher. The abundance and diversity of the studied biological communities (earthworms, earwigs, and spiders) varied depending on the system and year. On a global scale, the environmental impact of the systems was reduced by decreasing the use of pesticides. Production costs were higher in LI and ORG than in CON systems, but without price premium in LI. Finally, the LI system required a specific context and access to information for its implementation.

This experimentation emphasize decisive choices made at the plantation stage, namely for the choice of the cultivar, and to adjust practices to biotic and abiotic conditions by using decision support tools.

*Treatment Frequency Index (TFI): Equivalent number of registered doses applied per year for all commercial products.

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **[EUFRUIT: Réseau thématique européen sur les fruits]**

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

***Author/native language editor:** [Penvern Servane, UR 0767 Ecodéveloppement, INRA PACA, Site Agroparc, 228 route de l'Aérodrome CS 40509, 84914 Avignon cedex 9, servane.penvern@inra.fr, 0033432722574]

Section A. Summary for EIP dissemination

***Keywords:** [system approach, peach orchards, organic, low-input, longitudinal survey, economical values, decision rule, multicriteria evaluation]

***Main geographical location:** [FR614 Lot-et-Garonne, FR612 Gironde, FR713 Drôme, FR81 Languedoc Roussillon, FR812 Gard, FR826 Vaucluse]

Other geographical locations: [copy other NUTS 3 region from section C, below, 'NUTS 3 region(s)']

***Summary (native language):**

Le projet EcoPêche (2013 – 2018) est un réseau d'expérimentation système regroupant 7 partenaires (3 unités INRA, Ctifl, 3 stations régionales d'expérimentation) qui vise à concevoir et évaluer des vergers de pêche-nectarine économes en produits phytopharmaceutiques et en intrants. Huit expérimentations systèmes de culture sont conduites dans 7 sites expérimentaux répartis dans les principales régions de production de la pêche en France. Le projet évalue au total 24 systèmes plantés entre 2010 et 2013 avec 10 systèmes servant de référence (REF) reproduisant les pratiques locales des producteurs, 3 systèmes conduits en Agriculture Biologique (BIO) et 11 systèmes économes en produits phytosanitaires (ECO). Les objectifs visés sont une réduction de 30 à 50 % de l'Indice de Fréquence des Traitements (IFT) dont zéro herbicide tout en essayant de préserver la rentabilité économique des vergers. Si les premiers résultats sont encourageants (-31% des IFT dans les systèmes ECO -41% dans les systèmes BIO), une évaluation multi-critères est indispensable pour prendre en compte l'ensemble des performances en particulier les aspects économiques (-19% du rendement commercialisable dans les systèmes ECO et -67% en BIO). Ces premiers résultats sont aussi fortement dépendants de la jeunesse des vergers et les expérimentations doivent se poursuivre.

Summary (english):

The EcoPêche project (2013-2018) funds a network of systemic experimentations conducted by 7 partners (3 INRA units, Ctifl, 3 regional experimental stations) with the aim to design and evaluate nectarine orchards that are economical in plant protection products and inputs. Eight cropping systems experimented in 7 sites distributed in the main peach production regions in France. The project evaluates a total of 24 systems planted between 2010 and 2013 with 10 reference systems (REF) reproducing local practices of producers, 3 systems conducted in Organic Farming (BIO) and 11 systems that are economical in plant protection products (ECO). The target is a 30-50% reduction in the Treatment Frequency Index (TFI), including zero herbicides, while maintaining the economic profitability of the orchards. The first results are encouraging (-31% of TFI in ECO systems and -41% in BIO), a mutli-criteria evaluation is essential to take into account trade-offs namely economic aspects (-19% of the marketable yield in the ECO systems and - 67% in BIO). These first results are also heavily dependent on the youngness of the orchards and the experiments must continue.

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. Créer un réseau européen sur le secteur des fruits
2. Développer et mettre en place une approche systémique pour le recensement et la synthèse de connaissances pratiques et scientifiques existantes
3. Mettre en place un dialogue avec les instances politiques européennes, nationales et régionales pertinentes
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1. Establish a European network focused on the fruit sector.
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22. NIAB EMR (new 09-02-2016)

Section C. Annex: Scanning report[1]

Scanning report
[Servane Penvern, INRA]

Author: [Penvern Servane, UR 0767 Ecodéveloppement, INRA PACA, Site Agroparc, 228 route de l'Aérodrome CS 40509, 84914 Avignon cedex 9, servane.penvern@inra.fr, 0033432722574]

Country: [France]

NUTS 3 region(s)[2]: [[FR614 Lot-et-Garonne, FR612 Gironde, FR713 Drôme, FR81 Languedoc Roussillon, FR812 Gard, FR826 Vaucluse]]

WP no. and title: [WP3]

Date: [24/05/2017]

Source materials and methodology

We directly contacted Daniel Plenet, coordinator of the Eco-Pêche project, author of the abstract below. For now only few communications have been made (mostly oral presentations, a technical report and an article in the technical press) since the experimented orchards are still relatively young. The project ends in 2018, consolidated results should then be communicated. Though we thought interesting to share these results on peach growing, less addressed in the report, with impressive inputs reductions achieved thanks to a systemic approach combing multiple methods similar to the BIORECO system. We attached to this scan, online accessible communication supports:

- A technical report: Plénet, D., Hilaire, C., Blanc, P., Borne, S., Bouvery, F., Bussi, C., Couthieu, N., Gallia, V., Greil, M.-L., Hostalnou, E., Labeyrie, B., Mercier, V., Millan, M., Montrognon, Y., Monty, D., Pinet, C., Rouet, P., Ruetch, J. (2014). EcoPêche - Conception et évaluation multisite de vergers de pêche – nectarine économes en produits phytosanitaires et en intrants. Rapport technique de la campagne 2014
- A recent press article : http://www.arboriculture-fruitiere.com/content/des-pratiques-ecoresponsables-dans-les-vergers-de-peches-et-dabricots
- Two oral presentations : see attached

Best practice findings

The EcoPêche project (2013-2018) funds a network of systemic experimentations conducted by 7 partners (3 INRA units, Ctifl, 3 regional experimental stations) with the aim to design and evaluate nectarine orchards that are economical in plant protection products and inputs. Eight cropping systems experimented in 7 sites distributed in the main peach production regions in France. The project evaluates a total of 24 systems planted between 2010 and 2013 with 10 reference systems (REF) reproducing local practices of producers, 3 systems conducted in Organic Farming (BIO) and 11 systems that are economical in plant protection products (ECO). The target is a 30-50% reduction in the Treatment Frequency Index (TFI), including zero herbicides, while maintaining the economic profitability of the orchards.

Strategies to reduce the use of plant protection products are based on structural choices made during orchard planting (planting distances, shape of the tree, irrigation system, agro-ecological infrastructures, etc.), except regarding the genetic material (Bioagressor-resistant variety) not yet available for peach cultivar. Annual technical management strategies combine (i) cultural methods to prevent pests infestations by acting via the plant (vigor, water status, nitrogen status, fruit growth rate, etc.) and / or via the microclimate and (ii) alternative protection methods such as the use of physical barriers, biotechnical control methods (mating disruption, etc.) and biocontrol products, along with (iii) methods to promote functional biodiversity (habitats and resources for auxiliaries via composite hedges, floral stripes, etc.) to increase ecological regulation. No herbicides have been used from planting thanks to various row management techniques (mechanical weeding, mulching or total grassing). These alternative strategies are implemented on all the ECO and BIO systems but with a greater or lesser intensity according to the objectives set by the person in charge of the experiment and the constraints inherent to each site.

[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 results are still heavily dependent on the youngness of the orchards (plantation mainly in 2013). In the reference systems, the average use of plant protection products was 23.2 TFI / year for orchards in production (≥ 3rd leaf) over the period 2013-2016. Total TFIs were reduced by 35% in the ECO systems and by 55% when biocontrol products are excluded. Still excluding biological products, the reduction was more important for insecticide products (-75%) than for fungicides (-42%). In the 3 BIO systems, total FTIs decreased by 41% and 74% when biocontrol products are excluded. In ECO systems, reasoning and the use of decision-making tools reduced nitrogen fertilization (-12%) and irrigation (-14%). Working load was also reduced by 16% in ECO and 38% in BIO. This strong reduction in the use of plant protection products and the inputs-saving were accompanied by a decrease of the marketable yields (on average -19% in ECO and -67% in BIO). The production costs were also reduced by - 18% and -28% in ECO and BIO compared to the REF systems but it was, however, not sufficient to compensate the decline in turnover, resulting in a reduction of the margins by around -4.5 % in ECO and -19% in BIO compared to REF. These first results must, however, be consolidated over the orchards' lifespan.

A multicriteria assessment is also needed to determine acceptable trade-offs between economic values and the benefits associated to reduced inputs consumption with less environmental impacts.

Scanning report (EIP format for practice abstracts)

***Project title (native language):** **[EUFRUIT: European Fruit Network]**

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

***Author/native language editor:** [Claudio Ioriatti, FEM, claudio.ioriatti@fmach.it +39 0461 615 514]

Section A. Summary for EIP dissemination

***Keywords:** [apple, mechanization, biocontrol, resistant varieties]

***Main geographical location:** [ITD20, Trentino-Alto Adige]

Other geographical locations: [copy other NUTS 3 region from section C, below, 'NUTS 3 region(s)']

***Summary (native language):** Il tema della riduzione dei residui di fitofarmaci sulle mele ha assunto particolare rilievo anche per la frutticoltura trentina. Questo obiettivo è perseguito mediante una ottimizzazione dei tempi e delle modalità di applicazione dei fitofarmaci e attraverso lo sviluppo e la diffusione di possibili alternative biologiche che non lasciano residui sulla frutta. Dal punto di vista agronomico il tema viene affrontato attraverso la proposta di una nuova architettura del frutteto che faciliti la meccanizzazione quale alternativa all'intervento chimico e mediante la selezione di nuove varietà resistenti alla ticchiolatura

Summary (english):

[space for optional translation of the native language short summary of scanning report to English]

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

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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. Stabilire un network europeo focalizzato sul settore frutticolo
2. Sviluppare ed implementare un approccio sistemico per rilevare e sintetizzare la conoscenza scientifica e applicativa esistente
3. Stabilire in dialogo continuo con i più rilevanti organi politici europei, nazionali e regionali
4. Indentificare e supportare le aree di ricerca prioritarie attraversi un costante monitoraggio e analisi delle attività di ricerca e innovazione in essere.

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
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Country: [ITALY]

NUTS 3 region(s)[2]: [ITD20, Trentino-Alto Adige]

WP no. and title: [3 – Reduction in pesticides residues]

Date: [10-04-2017]

Source materials and methodology

Since early Nighties IFP-guidelines are adopted by the apple production system in Trentino (Ioriatti and Lucchi, 2016). At commercial orchard stage, high attention is addressed to the issue of pesticide residues on apple by refining application timing by introducing alternative techniques such as non-chemical alternatives (Ioriatti and Lucchi 2016; Angeli et al., 2017) or by improving pesticide application (Bondesan et al., 2016a). Innovative approaches are under investigation in pilot orchards and are concerning spray techniques (Bondesan et al., 2016b), sterile insect technique (Arnone et al., 2017) as well as new fruit tree architecture as a nexus to improve sustainability in orchards (Dorigoni 2016).

Arnone et al., 2017. La Tecnica dell'Insetto Sterile: nuove tendenze e possibilità di applicazione in Italia per il contenimento di specie fitofaghe. L'Informatore Agrario (in press).

Angeli G., et al. 2017. Aerosol technology to control codling moth with mating disruption: how moth behaviour changes when directly exposed to the pheromone puffs or in response to pheromone treated leaves. IOBC/WPRS Bulletin (in press)

Bondesan D., et al., 2016a. Efficacy evaluation of fungicide application with anti-drift air-injection nozzles sprayng one side of applet ree rows. ATTI Giornate Fitopatologiche, 2: 83-92.

Bondesan, D., et al., 2016b. First assessments of fixed spray application systems in narrow-wall apple orchards. International Advances in Pesticide Application Aspects of Applied Biology 132, 411-414.

Dalpiaz A (2014) Innovazione e organizzazione, le uniche risposte per uscire dalla crisi. Frutticoltura, 11:2-6

Dorigoni A., Innovative fruit tree architecture as a nexus to improve sustainability in orchards Acta Horticulturae 1137, Avignon Symposium ISHS, 2016. Proc. Int. Symposium on innovation in integrated and organic Agriculture 8/6/2015, 1-10

Ioriatti C., Lucchi A. 2016. Semiochemical Strategies for Tortricid Moth Control in Apple Orchards and Vineyards in Italy. J. Chem Ecol. 42, Issue 7, pp 571–583.

Best practice findings

Best practices for reducing the use of pesticides in apples (according to the 9 topics suggested)

The entire apple production in Trentino apply voluntary level of guidelines for integrated fruit production approved by the IPM commission of the agricultural ministry.

1) Use of decision support systems (monitoring, Pheromone, models):
   a. IPM Base. Pheromone monitoring traps are area wide deployed and periodically serviced by the advisory service. RIMpro model are available online for all the apple growers that have subscribed the advisory service (85%). The consultants carry out field scouting in order to better fit the technical advice with the real field situation.
2) Spray application (quality, dose and volume, fix spraying system, injection.

[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

a. IPM Base. Calibration of the air blast sprayers is compulsory since late Nighties and about 700 machines are controlled every year in order to check them all every 5 years. Replacement of the fine or very fine hollow cone hydraulic nozzles are implemented on part of the air blast sprayers to reduce pesticide drift toward the sensible areas. TRV has been evaluated and it is a best practices to disseminate.

b. Experimental stage:

   i. Different fixed spray systems are under evaluation on experimental farms in combination with fruit-wall training system and exclusion netting

3) Chemical strategies: increase the pre-harvest interval, use restriction, specific list, depending on the stage

a. Commercial orchard stage: restriction in the use of registered pesticides is volantary taken under the regional IPM guidelines. (es chlorpyrifos)

b. IPM Base: Chemical strategies are implemented to fit the quality standard required by the most important supermarket chains (<30% LMR, max 4 a.i. etc) The apple production is regularly checked on the pesticide residue level by analyzing about 600 samples.

c. Experimental stage:

   i. ozone therapy for the apple scab contro; the effect of ozonated water overhead treatments is under evalution in an apple orchard,

   ii. Strategic irrigation to elicit the release of apple scab ascospores;

4) Bio-control products (micro-organisms, pheromone, natural products, macro-organisms).

a. Commercial orchard stage: mating disruption is applied on 7500 ha to control codling moth (CM) and oriental fruit moth in apple orchard (OFM). Codling moth granuloses virus is applied in organic farms when MD is not applicable due to small size of the orchard. Post blossom metoxyfenozide and clorantranilibrole are frequently applied to control overwintering leafroller larvae (LR), as supplemental insectivide treatment in the Codling moth MD treated area.

   i. In 2016 Pilot experiences of reduction of these post blosson treatments have been implemented on about 600 ha and further spread of this pilot experiance is planned for 2017. Pilot orchards under MD are selected according to thier low hystorical infestation and, based on accurate monitoring activity with pheromone traps and visual inspections, they will not receive post blosson insecticide for CM and LR usually applied

   ii. As a consequence of the increasing presence of *C. capitata* in the apple orchards ”attract and kill technology” are implemented as an alternative to the chemical control in order to reduce pesticide residues of the fruit at harvest.

b. IPM Base. European spider mite is naturally controlled by predatory mites. Specific acaricides are not generally applied.

c. Experimental stage:

   i. Implementation of multi-species (CM+ LR) aerosol dispensers;

   ii. SIT to control MFF and CM,

   iii. Areobasidium pullulans and Bacillus subtilis for post-harvest diseases, are under investigation at experimental stage

5) Physical barrier (nets, plastic cover)

a. Commercial orchards stage: physical barrier are used to reduce the pesticide drift out of the orchard. In addition to the specific areas included in the DIRECTIVE 2009/128/EC, the regional implementation of the PAN envisages the use of physical barrier as an appropriate risk management measures to allow chemical treatments when less than 10 meter from the private houses. Only few apple orchard are using Alt–carpo for combined control of CM and hail.

b. Experimental stage:

   i. rain cover for reducing scab infection; first results are very encouraging even though they promote woody apple aphid infestations on vigorous varieties (ex. Fuji).

6) Mechanisation (thinning, alternative to herbicides)

a. Commercial orchard stage: mechanical thinning, mechanical pruning and mechanical weed control are more and more implemented.
b. Experimental stage:
    i. The new fruit-wall based on multi-leader tree architecture makes it much easier than in the past. Pilot orchards are present in different areas of the region

7) Genetics (resistant varieties)

a. Commercials orchards stage. Some interesting new scab resistant varieties (galant and Isaaq) are available and promoted by the apple-growers association.
b. Experimental stage:
    i. A specific breeding program for apple scab resistant varieties is in place at FEM

9) Alternative to postharvest treatments, remove pesticide on fruits.

a. Experimental orchards stage: pesticides are not allowed in post harvest. Removal of pesticide residues on fruits with ozonated water is under investigation.