Scanning report (EIP format for practice abstracts)

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

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

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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
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[1]

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

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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-T/S and Spruzit Neu,

[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

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
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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
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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 syncончy 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

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[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

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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.