

Scanning report (EIP format for practice abstracts)

- *Project title (native language):** EUFRUIT: Europäisches Obst-Netzwerk
- *Project title (English):** EUFRUIT: European Fruit Network
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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 mehligigen 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 Keimphase 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 Mineralisierungsverhalten 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, Dampfsterilisation, 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 Freiland 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 Einnetzsystemen zeigten bei mittlerem Druck gute Ergebnisse. In Befallslagen konnte sich allerdings nach einigen Jahre trotzdem ein starker Befall einstellen. Bei frühzeitigem 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 mehliges 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 copper. 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 (Waremmе-Borgworm), BE335 (Verviers), FR8 Méditerranée; FR81 Languedoc-Roussillon, FR6 SUD-OUEST, FR512 Maine et Loire, FR611 Dordogne, FR812 Gard, DE6 (Hamburg), DE8 (Mecklenburg-Vorpommern), DE9 (Niedersachsen), DEF0 (Schleswig-Holstein), DEE0 (Sachsen-Anhalt), DEA (Nordrhein-Westfalen), DE111, DE112, DE113, DE114, DE115, DE116, DE117, DE118, DE119, E11A, DE11B, DE11C, DE11D, DE121, DE122, DE123, DE124, DE125, DE126, DE127, DE 128, DE129, DE12A, DE12B, DE12C, DE131, DE132, DE133, DE134, DE135, DE136, DE137, DE138, DE139, DE13A, DE141, DE142, DE143, DE144, DE145, DE146, DE147, DE148, DE149, DE600 Hamburg, DE932 Cuxhaven, DE933 Harburg, DE939 Stade, DEF09 Pinneberg, NL1-NL4 + NLZ Holland; NL 224 zuidwest Gelderland, NL 226 Arnhem/Nijmegen, NL230 Flevoland, NL310 Utrecht, NL321 Kop van Noord-Holland, NI322 Alkmaar en omgeving, NL338 oost Zuid-Holland, NL33A zuidoost Zuid-Holland, NL341 Zeeuws-Vlaanderen, NL342 overig Zeeland, NI411 west Noord-Brabant, NL413 noordoost Noord-Brabant, NL414 zuidoost Noord-Brabant, NL421 noord Limburg, NL422 Midden-Limburg, NL423 zuid Limburg, ES620 Murcia, UKG11 Herefordshire, UKG12, Worcestershire, UKH12 Cambridgeshire, UKH16 North and West Norfolk, UKH17 Breckland and South Norfolk, UKJ22 East Sussex, UKJ35 South Hampshire, UKJ36 Central Hampshire, UKJ37 North Hampshire, UKJ41 Medway, UKJ42 Kent, UKJ43 Kent Thames Gateway, UKJ44 East Kent, UKJ45 Mid Kent, UKJ46 West Kent, ES618 Sevilla, ES511 Barcelona, ES512 Gerona, ES513 Lérida, ES514 Tarragona, CH0 Schweiz/Suisse/Svizzera, ITH51-59 Emilia Romagna region, ITH10 Bolzano-Bozen, HU101 Budapest, HU102 Pest, RO111, RO112, RO113, RO114, RO115, RO121, RO122, RO123, RO124, RO125, RO126, RO211, RO212, RO213, RO214, RO215, RO216, RO221, RO222, RO223, RO224, RO225, RO226, RO311, RO312, RO313, RO314, RO315, RO316, RO317, RO321, RO322 RO411, RO412, RO413, RO414, RO415, RO421, RO422, RO423, RO424. HU101, HU102, LT001 Alytaus apskritis, LT002 Kauno apskritis, LT003 Klaipėdos apskritis, LT004 Marijampolės apskritis, LT005 Panevėžio apskritis, LT006 Šiaulių apskritis, LT007 Tauragės apskritis, LT008 Telšių apskritis, LT009 Utenos apskritis, LT00A Vilniaus apskritis.

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

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

1. 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) • Pcfuit

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

Section C. Annex: Scanning report¹

Scanning report Markus Kelderer, Laimburg

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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 varieties, 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 methodology 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 15th International Conference on Organic Fruit Growing, 116 -122

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

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

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 copper. 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.