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SYNTHESIS REPORT AND DISSEMINATION CATALOGUE

Work package 4: Improvement of fruit storage methods

March 2016 – August 2017

EUFRUIT

Project documentation sheet	
Project acronym	EUFruit
Project title	European Fruit Network
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Project officer	Veerle Lammens
Coordinator	Dr. Michelle Williams, Aarhus University Department of Food Science • AU
Consortium Partners	<ol style="list-style-type: none"> 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 Dienst Landbouwkundig Onderzoek (Netherlands) • StDLO 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 • NIAB EMR (New 09-02-2016)*
Website	http://eufrin.org
Knowledge Platform	http://kp.eufrin.org

* Partner 6 (EMR) has been transferred to NIAB EMR. NIAB EMR is committed to performing all project tasks previously assigned to EMR. The personnel involved by EMR will continue performing the work in the project.

Deliverable documentation sheet	
Number	Deliverable D4.2
Title	Synthesis report and catalogue of outreach activities
Related WP	WP4 (Improvement of fruit storage methods)
Related task	Task 4.2 (Synthesising, identifying and prioritising existing knowledge)
Lead beneficiary	OVA
Author(s)	Merete Brønsgaard Henriksen (AU) Dirk Köpcke (OVA)
Contributor(s)	None
Reviewer(s)	Michelle Williams (AU) Lise Nesgaard (AU)
Nature	R (Report)
Dissemination level	PU (Public)
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1. Synthesis report 2017



Synthesis report WP4 Fruit quality; improvement of fruit handling/storage

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Elbe-Obst Erzeugerorganisation r.V., Bassenflether Chaussee 4b, 21723 Hollern-Twielenfleth, www.elbe-obst.de, +49 (0) 41 41 / 95 31-46
- WP:** WP4
- IEG thematic area:** Fruit quality; improvement of fruit handling/storage
- Covered NUTS 3 regions:** DE6 (Hamburg), DE8 (Mecklenburg-Vorpommern), DE9 (Niedersachsen), DEF0 (Schleswig-Holstein), DEE0 (Sachsen-Anhalt), DEA (Nordrhein-Westfalen), DE600 Hamburg, DE928 Schaumburg, DE932 Cuxhaven, DE933 Harburg, DE939 Stade, DEF09 Pinneberg, DE1 (Baden-Württemberg), DE2 (Bayern)
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).
FR8, FR824 - Bouches-du-Rhône
ITH10 Bolzano-Bozen
LT002, Kauno apskritis
- Reporting period:** Y2 report due August 2017
- No. IEG members:** *Total: 19*
Male: 13
Female: 6

IEG participants

Name	Organization short name ¹	Type ²	Scanning included?	No. reports / organization
Merete EDELENBOS	AU	RTO	Yes	1
Vincent MATHIEU-HURTIGER Sebastian LUROL	CTIFL	RT	No	0
Dirk KÖPCKE	OVA	RTO	Yes	1
Alex VAN SCHAİK	WR	RTO	Yes	1
Robert SAVILLE	NIAB EMR	RTO	Yes	1
Joan BONANY Christian LARRIGAUDIÈRE	IRTA	RTO	Yes	1
Andreas BÜHLMANN	Agroscope	RTO	Yes	1
Angelo ZANELLA	Laimburg	RTO	Yes	1
Liliana-Aurelia BADULESCU	USAMV	RTO	No	0
Geza BUJDOSO	NARIC	RTO	Yes	1
Vidmantas BENDOKAS	LRCAF	RTO	Yes	1
Pauline PANEGOS	AREFHL	SME	No	0
Carsten GREISIGER	EO	SME	No	0
Richard COLGAN Rosalind FISHER	UoG	RTO	Yes	1
Daniel NEUWALD Nadine KLEIN	UHOH	RTO	Yes	1
Francesco SPINELLI	UNIBO	RTO	No	0
Sylvie BUREAU David PAGE	INRA	RTO	No	0
Eivind VANGDAL	NIBIO	RTO	No	0
Ann SCHENK	VCBT	RTO	No	0
Manuela ZUDE	ATB	RTO	No	0
Ines HANRAHAN	WTFRC	RTO	No	0
Auri BRACKMANN	UFSM	RTO	No	0

¹ If an EUFRUIT project partner, use EUFRUIT partner short name, if a contributing organization designate a partner short name

² Farm holder/grower, advisor/consultant, research institute/RTO, SME, NGO or other

Synthesis findings

Following topics are identified:

Most of the research institutes are still working intensive on **DCA-storage systems** (Dynamic Control Atmosphere). Different DCA-systems are being researched. There is a distinction between DCA^{CF}, DCA^{ETH} and DCA^{RQ}. CF stands for Chlorophyll Fluorescence. This is the most popular method to determine the Anaerobic Compensation Point (ACP). Different sensors like HarvestWatch (Satlantic Inc., Canada), ApplePAM (Walz GmbH, Germany) or Fruit Observer (Besseling Groep B. V., The Netherland) are used or tested at the different institutes. DCA^{ETH} is another technology to determine the ACP by measuring Ethanol in the atmosphere of the storage room (Dynamic Control System, DCS, Storex, The Netherland) or Ethanol plus Ethyl acetate and Acetaldehyde in the fruits using fruit samples (Lower Elbe Region, Austria). Finally the DCA^{RQ} technology uses the quotient between CO₂ production and O₂ consumption for measuring the ACP. There are the companies Van Amerongen from the Netherland with the ACR system (Advanced Control of Respiration) and Storage Control Systems Ltd from Great Britain / USA with their SafePod/LabPod system on the market. The effect of DCA on fruit quality (positive/negative effect on firmness, acid content, physiological disorders) and the comparison of different DCA technologies are actually in the focus of research in the different regions.

1-Methylcyclopropen (1-MCP) and its effect on fruit quality (fruit firmness, acid content, effect of different physiological disorders) are also in focus of the different researcher. But also the aim to save energy by increasing the storage temperature after 1-MCP treatment is a research topic. New 1-MCP products that maybe will be registered in the future in the EU but also new formulations or indications like Harvista is in the interest of research.

In general, **energy saving** e.g. by using new cooling technologies like EC fans (electronically commutated fans) or better airflow through the stacks of big boxes is more and more in the focus of some researchers. Especially the effect of temperature, ventilation, placing boxes in the storage room (distance, space between boxes, walls and evaporators) and technical changes in room design are main topics. At the same time, the aim is to **reduce water loss** of the stored fruits knowing that the energy or heat input leads to more cooling and more cooling leads to more water loss.

Most of the institutes are working on **new apple and pears varieties**. They try to determine the optimal harvest date and storage conditions (e. g. temperature and O₂/CO₂-level) and also the compatibility of these new varieties to 1-MCP and the usefulness of a treatment. Actual e. g. Kanzi (Nicota), Migo (Cepuna), Sweet Tango, Natyra, Rockit and different red flesh varieties are in focus of the tester.

To **avoid food loss by rotting** is a big theme in postharvest research. Measuring specific volatiles that are related to specific storage diseases, using new metagenomics determination and Hot water treatment (HWT) are examples of new diagnostic and control technologies that could help to reduce microorganism infections or the use of chemical pesticides in pre- and postharvest.

One big topic is also **bruising** of apples and pears. They are looking for technology to measure objectively bruising e. g. to determine the sensitivity of different fruit varieties. The physiological background of the development process of bruising and naturally the possibilities to avoid bruising or assistance for the fruit grower (videos for picking personal, optimization of the grading machines, handbooks) is also still in focus.

Extending the storage life and shelf-life of plums and cherries seems to be a growing point of interest of some working groups. Improvements in fruit and stem quality through reducing cracks, diseases, accurate assessment of harvest maturity, forced cooling systems and better storage solutions are important aims.

Some of the research institutes are testing different **fruit quality analyzing technologies**. On the one hand there are the destructive measurements methods and instruments like the Pimprenelle (e. g. Setop, France) or a lot of new non-destructive analyzer or devices e. g. using near infrared (NIR) measuring technologies to determine chlorophyll content (DA-meter).

Summary for IEG dissemination

Project title: EUFRUIT: European Fruit Network

Keywords: storage, fruit quality, postharvest

Summary: Most of the research institutes are working on technical but also chemical methods for a better maintenance of fruit quality after harvest. The actual most interesting technologies to maintain fruit quality are **DCA-storage** (Dynamic Control Atmosphere) and postharvest treatment with **1-Methylcyclopropen (1-MCP)**. **Reducing food loss** (e.g. due to fungi infections or bruising) as well as reducing **energy loss** in fruit storage were also themes of some researcher. Other research institutes are testing different **destructive and non-destructive measuring technologies** of fruit quality. Most of the institutes are working on storage of **new apple and pear varieties but also on different stone fruit cultivars**.

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Contributing project partners: AU, CTIFL, OVA, StDLO, IRTA, AGROSCOPE, LAIMBURG, USAMV, NARIC, LRCAF, AREFHL, EO, UoG, UHOH, UNIBO, INRA, NIAB EMR.

Additional contributors: Eivind Vangdal of NIBIO (RTO), Ann Schenk of VCBT (RTO) and Manuela Zude of ATB (RTO).

2. Dissemination catalogue of planned and executed activities 2016-2018

Activity types	Executed 01-03-2016 – 01-06-2017		Additionally planned the 2. year up to 28-02-2018
	No. activities	No. participants	No. activities
A. Participation in...			
A1: Dialogue meeting (policy)	OVA:6, LRCAF: 1	<i>Total: 94 Female: 17 Male: 77</i>	OVA: 1
A2: EIP-AGRI conference or workshop		<i>Total: Female: Male:</i>	
A3: Scientific conference	OVA: 4, AGROSCOPE: 1, LAIMBURG: 25, LRCAF: 3, UHOH: 29	<i>Total: 1.447 Female: 247 Male: 422</i>	AGROSCOPE: 3 LAIMBURG: 2, UHOH: 7
A4: Industry event or exhibit	OVA:1,WR:1, LRCAF: 3, UHOH: 29	<i>Total: 5.571 Female: 514 Male: 2.557</i>	AU: 1, UHOH: 1
A5: Other stakeholder meeting	WR: 2, IRTA: 7, LAIMBURG: 5, UHOH:16	<i>Total: 822 Female: 264 Male: 464</i>	IRTA: 8, UHOH: 3
A6: Event aimed at general public	LAIMBURG: 10, LRCAF: 1 NIAB EMR/UoG: 1	<i>Total: 400 Female: Male:</i>	
B. Organising/holding...			
B1: Seminar/lecture-based workshops	OVA: 7, AGROSCOPE: 3, LRCAF: 6, UHOH: 6	<i>Total: 589 Female: 196 Male: 393</i>	AGROSCOPE: 3 UHOH: 6
B2: Field-based workshops		<i>Total: Female: Male:</i>	
B3: Open demonstration day		<i>Total: Female: Male:</i>	NARIC: 2
B4: Field visit	OVA: 3, LAIMBURG: 11, LRCAF: 1, UHOH: 6	<i>Total: 639 Female: 55 Male: 301</i>	UHOH:3
B5: Industry group meeting/event	AU: 1, WR: 1, LAIMBURG: 25, LRCAF: 1	<i>Total: 786 Female: 32 Male: 194</i>	LAIMBURG: 1

B6: Other stakeholder meeting/event		<i>Total:</i> <i>Female:</i> <i>Male:</i>	CTIFL: 1, IRTA: 1
B7: event aimed at general public	LRCAF: 3	<i>Total:</i> <i>Female:</i> <i>Male:</i>	LRCAF: 2
C. Publication of...			
C1: EIP-AGRI practitioner abstract			
C2: Technical bulletin/guideline	AGROSCOPE:1, NIAB EMR/UoG: 1		AGROSCOPE: 1
C3: Flyer/leaflet			
C4: Newsletter	CTIFL: 1, LRCAF: 1 NIAB EMR/UoG: 1		
C5: Book/booklet/chapter	OVA: 1		UHOH: 1, INRA: 1
C6: Audio/video content			
C7: IEG Synthesis report	OVA: 2		
D. Publication in...			
D1: Scientific journal (peer review)	AU: 1, OVA: 4, LAIMBURG: 3, LRCAF: 1, UHOH: 3, INRA: 1, NIAB EMR/UoG: 1		AU: 2, OVA: 1, LAIMBURG: 5, NIAB EMR/UoG: 1
D2: Technical journal	CTIFL: 4, AGROSCOPE: 1, LAIMBURG: 10, UHOH: 11		CTIFL: 2 LAIMBURG: 9
D3: Industri journal/magazine	WR: 2, LAIMBURG: 4 NIAB EMR/UoG: 1		LAIMBURG: 1
D4: Other stakeholder journal/magazine			

D5: Journal/magazine aimed at general public		
E. Final project conference		
E1: Participation with presentation (oral)	<i>Total:</i>	
	<i>Female:</i>	
	<i>Male:</i>	
E2: Participation with presentation (poster)	<i>Total:</i>	
	<i>Female:</i>	
	<i>Male:</i>	
E3: Other material	<i>Total:</i>	
	<i>Female:</i>	
	<i>Male:</i>	