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SYNTHESIS REPORT AND DISSEMINATION CATALOGUE

Work package 4: Improvement of fruit storage methods

March 2016 – August 2016

EUFRUIT

Project documentation sheet	
Project acronym	EUFruit
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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 D4.1
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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TABLE OF CONTENTS

1. Synthesis report 2016.....	7
IEG participants	8
Synthesis findings	9
Summary for IEG dissemination	10
2. Dissemination catalogue of planned and executed activities 2016.....	12

1. Synthesis report 2016



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

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- 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:** Y1 report due August 2016
- No. IEG members:** *Total: 13*
Male: 10
Female: 3

IEG participants

Name	Organization short name ¹	Type ²	Scanning included?	No. reports / organization
Merete Edelenbos	AU	RTO	Yes	1
Vincent Mathieu-Hurtiger	CTIFL	RTO	Yes	1
Sebastien Lurol	CTIFL	RTO	Yes	1
Dirk Köpcke	OVA	RTO	Yes	1
Alex van Schaik	StDLO	RTO	Yes	1
Robert Saville	NIAB EMR	RTO	Yes	1
Joan Bonany	IRTA	RTO	No	0
Christian Larrigaudiere	IRTA	RTO	No	0
Andreas Bühlmann	Agroscope	RTO	Yes	1
Angelo Zanella	Laimburg	RTO	Yes	1
Adrian Chira	USAMV	RTO	No	0
Geza Bujdoso	NARIC	RTO	No	0
Vidmantas Bendokas	LRCAF	RTO	Yes	1
Jaques Dasque	AREFHL	SME	No	0
Pauline Panegos	AREFHL	SME	No	0
Carsten Greisiger	EO	SME	Yes	1
Richard Colgan	UoG	RTO	Yes	1
Daniel Neuwald	UHOH	RTO	Yes	1
Francesco Spinelli	UNIBO	RTO	Yes	1
Sylvie Bureau	INRA	RTO	Yes	1
Eivind Vangdal	NIBIO	RTO	No	1
Ann Schenk	VCBT	RTO	Yes	1
Manuela Zude	ATB	RTO	Yes	1

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/RSO, SME, NGO or other

Synthesis findings

Following topics are identified:

Most of the research institutes are working 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 Group B. V., The Netherlands) 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 Netherlands) 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 CO_2 production and O_2 consumption for measuring the ACP. There are the companies Van Amerongen from the Netherlands with the ACR system (Advanced Control of Respiration) and ICA Storage from Great Britain with their SafePod 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 technology is actual in the focus of research in the different regions.

1-Methylcyclopropan (1-MCP) and its effect on fruit quality (fruit firmness, acid content, effect of different physiological disorders,...) is still 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.

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.

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, ...).

Most of the institutes are working on **new apple varieties** sometimes also on other or even new fruit species. They try to determine the optimal harvest date and storage conditions (e. g. temperature and O_2/CO_2 -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.

A quite new topic is the **Hot water treatment (HWT)** of apples to avoid fungi diseases of storage fruits. Research questions are the heat sensitivity of the different varieties (temperature and duration) and the influence of the production system, region, and seasonal effects etc. on the intensity of heat damages. The question was whether this theme is a topic of WP 4 or better for WP 3 (avoid residues) or both.

Reducing **energy loss** was a theme of some researcher. 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 the main topics.

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 technology to maintain fruit quality is **DCA-storage** (Dynamic Control Atmosphere). It is known that fruit quality maintain better under very low oxygen level. The problem is that too low oxygen level can lead to fermentation und thus to off-flavor and physiological disorders like internal browning. Nowadays different technologies are available to measure the lowest tolerated oxygen concentration. The effect of DCA on fruit quality and the comparison of different DCA technology are actually in the focus of research in the different regions.

A chemical method to maintain fruit quality is the treatment with **1-Methylcyclopropen (1-MCP)** after harvest. 1-MCP inhibit the production of the fruit own ripening hormone Ethylene and thus slow down the ripening process during storage. The effect of this chemical on postharvest fruit quality is still in focus of research.

Another big topic is still the theme **bruising** of apples and pears. The main research here is to look on the physiological background and for possibilities to avoid or reduce this problem.

Some of the 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 varieties** and other or even new fruit species.

A quite new topic is the **Hot water treatment** of apples after harvest to avoid fungi diseases of storage fruits by activating mechanisms of resistances.

Reducing **energy loss** in fruit storage was also a theme of some researcher.

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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.

Project web page: www.eufrin.org

2. Dissemination catalogue of planned and executed activities 2016

Activity types	Executed		Additionally planned the 1. year
	No. activities	No. participants	No. activities
A. Participation in...			
A3: Scientific conference	OVA: 2	<i>Total: 22</i> <i>Female: 2</i> <i>Male: 20</i>	AGROSCOPE: 1 LAIMBURG: 10 LRCAF: 3 NIAB EMR/UoG: 1
A4: Industry event or exhibit		<i>Total:</i> <i>Female:</i> <i>Male:</i>	AU: 1 OVA: 1 LRCAF: 2 NIAB EMR/UoG: 1
A6: Event aimed at general public	NIAB EMR/UoG: 1	<i>Total:</i> <i>Female:</i> <i>Male:</i>	LRCAF: 1
B. Organising/holding...			
B1: Seminar/lecture-based workshops	OVA: 1 INRA: 1	<i>Total: 53</i> <i>Female: 4</i> <i>Male: 49</i>	AGROSCOPE: 3 LRCAF: 5 NIAB EMR/UoG: 1
B2: Field-based workshops		<i>Total:</i> <i>Female:</i> <i>Male:</i>	NIAB EMR/UoG: 1
B4: Field visit		<i>Total:</i> <i>Female:</i> <i>Male:</i>	OVA: 1 LRCAF: 1
B5: Industry group meeting/event	LAIMBURG: 8	<i>Total: 114</i> <i>Female: 25</i> <i>Male: 89</i>	AU: 1 LAIMBURG: 2 LRCAF: 1 NIAB EMR/UoG: 1
B6: Other stakeholder meeting/event		<i>Total:</i> <i>Female:</i> <i>Male:</i>	NIAB EMR/UoG: 1
B7: event aimed at general public		<i>Total:</i> <i>Female:</i> <i>Male:</i>	LRCAF: 1
C. Publication of...			
C2: Technical bulletin/guideline	NIAB EMR/UoG: 1	<i>Total:</i> <i>Female:</i> <i>Male:</i>	AGROSCOPE: 1

C4: Newsletter	LRCAF: 1 NIAB EMR/UoG: 1	<i>Total:</i> <i>Female:</i> <i>Male:</i>	
C5: Book/booklet/chapter		<i>Total:</i> <i>Female:</i> <i>Male:</i>	INRA: 1
D. Publication in...			
D1: Scientific journal (peer review)	OVA: 3 INRA: 1 NIAB EMR/UoG: 1	<i>Total:</i> <i>Female:</i> <i>Male:</i>	AU: 2 NIAB EMR/UoG: 1
D2: Technical journal	CTIFL: 1 AGROSCOPE: 1	<i>Total:</i> <i>Female:</i> <i>Male:</i>	CTIFL: 3 LAIMBURG: 3
D3: Industri journal/magazine	LAIMBURG: 2 NIAB EMR/UoG: 1	<i>Total:</i> <i>Female:</i> <i>Male:</i>	LAIMBURG: 2