



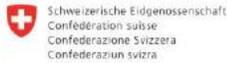
A short outline of scope and objectives of ‘InnOBreed’

“Innovative Organic Fruit Breeding and uses”

A targeted approach for maximizing Technological, Environmental, and Social Innovation impacts along the Fruit Value Chain.



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20 partners, 10 European countries, 11 Research Institutes,
4 NGO's, 3 Privates associations, 2 Universities



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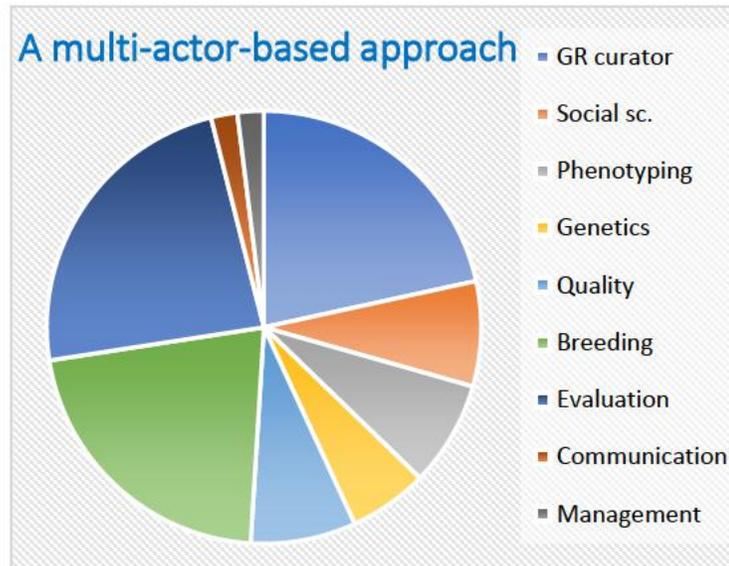


InnOBreed - Innovative action dedicated to cultivated Fruit tree species

Targeted on Breeding and Evaluation for Organic Farming requirements



- Pome fruits: Apple, Pear
- Stone fruits: Peach, Almond, Apricot, Cherry, Japanese Plum, European Plum
- Citrus
- Grape



Partners repartition	
Private	7
Grower's representative (NGO's)	4
Public Institutes	10



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InnOBreed – Co-Creation & implementation of « *Common good* »

Innovative solutions
Anchored on Organic Fruit growers = Multitrait Approach

- **Movement from Agronomic value to VSUC (on incremental bases)**
- **Number of traits & multitrait approaches**

- **Tolerance & Robustness**

Selecting material for (i) **robustness**: dynamic adaptability to biotic & abiotic stresses; (ii) good diseases **tolerance**; (iii) yield & quality; (iv) high nitrogen efficiency,....



Paradigm shift: from incrementation to breaking point

- Integration from model crops to applied species (*From Apple and Peach to applied Fruit species – Translational approaches*)



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WP9 – Coordination and Management, WP leader: CIHEAM-IAMB

STATE OF THE ART

WP1 – Mapping and assessing current situation
(Multi-Actor-based approach, concept and analytical framework)
WP leader: FIBL

CO-CREATION AND ANALYZE OF INNOVATIVE SOLUTIONS

WP2 – New breeding & evaluation methodologies
WP leader: INRAE

WP5 – Social and non-technological innovations
WP leader: Uni Pisa

Case studies
 CRA-W, CTIFL, GRAB, CEP-in, FiBL, ÖON, SERIDA, POMACULTA, CRSFA, Crowd breeding project, BOKU, AEGILOPS, EUFRIN network

WP3 – Innovative phenotyping
WP leader: IRTA

WP4 – Integrative Genetic Resources utilization
WP Leader: CRA-W

MAXIMIZE IMPACT

WP6 – Exploitation of results, Business & Policy recommendation
WP leader: WBF-Agroscope

WP7 - Dissemination, Communication, Training, Collaboration & Networking
WP leader: ARCADIA

Key Pathway to impact Biodiversity and Ecosystem services

WP8 – Impact assessment and risk management, WP leader: INNO



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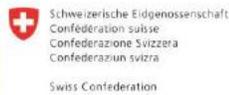
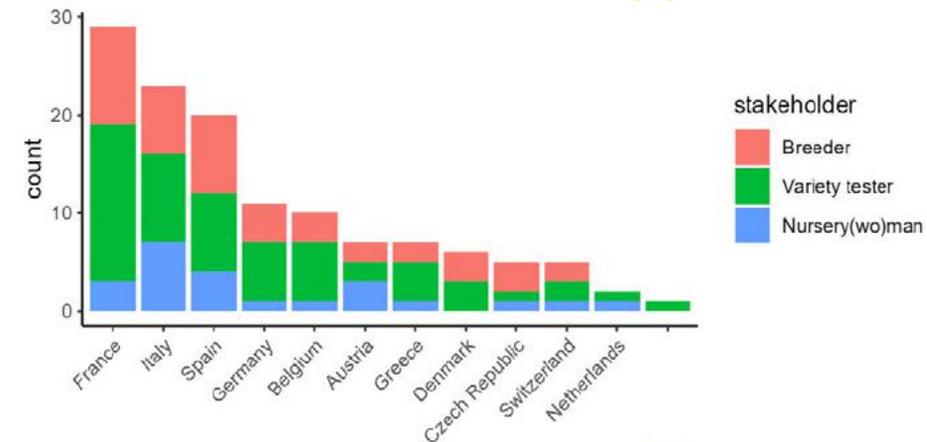
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InnOBreed – A multi-actor based approach Fruit Breeding & Evaluation

- *Main goal: to understand the current organic breeding **needs** and **lack of knowledge** across Europe.*
- InnOBreed particularity
 - ⇒ **OF cultivation system is considered as strategic reference for implementing the prospective targeted objectives**
 - ⇒ **Validation of the traits by a Participatory approaches**
 - BioFruitNet
 - InnOBreed (Stakeholders)
 - Traits and prioritization whatever the Cultivation system (InnOBreed Consortium)



	BioFruitNet	InnOBreed	Participants
Countries	26	11	Researchers / Advisers / Participants / Stakeholders / Growers / Breeders / Nurseries
Species	7	6	
Respondants	249	126	



InnOBreed - Co-Creation of Innovative solutions

Enlargement of the number of relevant Traits

□ Number and type of relevant traits

(predefined descriptors (ie EUFRIN + ECPGR) + InnOBreed survey list)

Number of traits per category	Pome fruit trees		Stone fruit trees		
	Apple	Pear	Peach	Apricot	Cherry
Tree traits	4	3	3	3	4
Phenology	8	4	8	7	11
Pomology / Fruit quality	38	35	26	22	37
Biotic stresses	23	20	15	12	8
Abiotic stresses	6	6	8	10	5
Total	79	68	60	54	65

⇒ **Large convergences between traits: Phenology – Fruit quality – (Tree characteristics – Abiotic stresses)**

⇒ **Major divergencies: Biotic stresses**

⇒ **Traits with major concerns: Climatic changes adaptation – Impact of reduced level of chemicals (OF)**

Would it be possible for the Plant geneticist, Breeders and Evaluators to address by the same time all these traits?



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InnOBreed – Co-Creation of Innovative solutions

Genetic Resources Management & Networking

Genetic resources

- Landraces – Wild – Modern cvs
- Hybrid – Pre-breeding populations

Objectives [\(link to ECPGR\)](#)

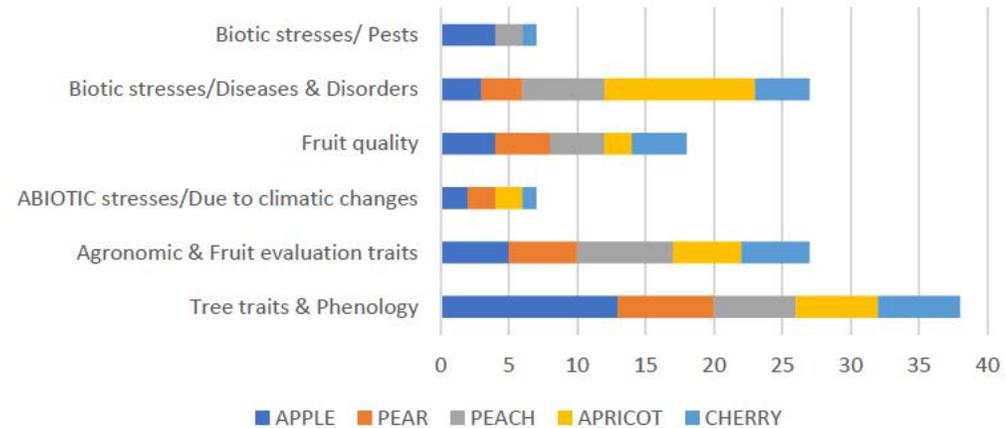
- Interconnect the collection
- Harmonize of the protocols
- Characterize the accessions
- Exchange the accessions
- Share the datasets

Actions

- Developing participative way for a better utilizations local fruit genetic resources with “robustness” traits**
- Inter-connecting organic case studies acting in organic breeding and evaluation**
- Implementing new harmonized protocols and methods which need to be agreed upon in a participatory way**



InnOBreed Common Mandatory evaluation traits descriptors



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“EUROrganic Fruits Breeding Network”



InnOBreed – Co-Creation of Innovative solutions

Social innovation = Participatory Breeding ++

Define, Characterize and evaluate what Social Innovation means in FTGR management

Genetics
(collection and
characterization)

Pre-breeding
(identify desired traits,
incorporating of these
into breeding material)
- Breeding - Testing

Cultivar
release and
use



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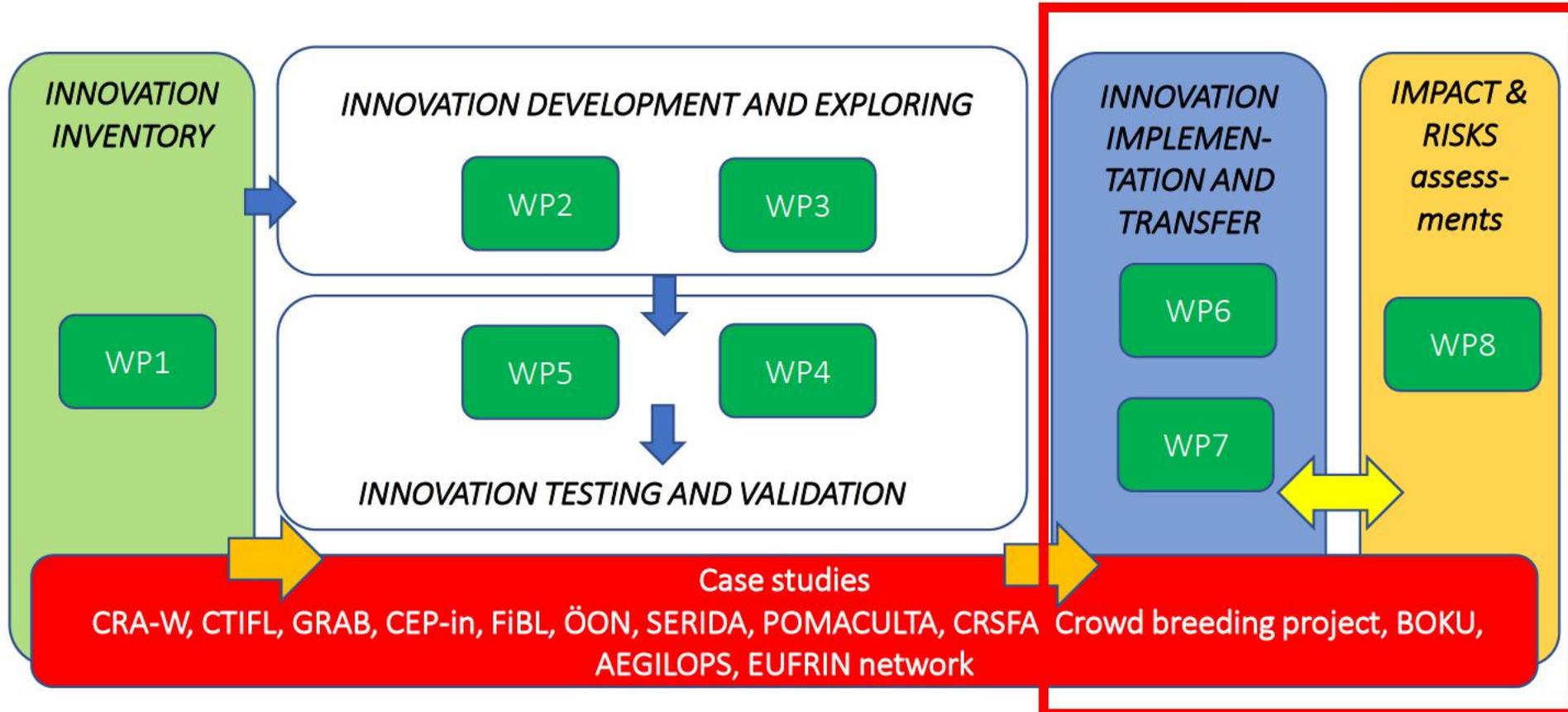
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InnOBreed

Case study based project: Share, Evaluate, Validate and Implement Innovative solutions



Innovation flow within organic fruit breeding and evaluation



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➤ Implementation of **EUFRI** descriptor lists (developed on apple and peach) with **Pests and Diseases specific traits**

➤ Development of **EUFRI** like descriptor list for the species already not integrated in EUFRIN Network (**Cherry, Apricot, Plum, Citrus, Grape, ...**)

T3.3 Pome Fruits		Trait	Plant & leaves	Fruits	Malus	Pyrus
Diseases	Fungus	Apple scab - <i>Venturia inaequalis</i> / Black spot of pear / pear scab - <i>Venturia pirina</i>	x	x	1	1
	Fungus	Powdery mildew - <i>Podosphaera leucotricha</i>	x		3	3
	Fungus	European canker - <i>Neonectria ditissima</i>	x		1	3
	Fungus	Blossom wilt (<i>Sclerotinia</i> sp.)	x		1	
	Fungus	Fruit Brown rot (<i>Monilinia</i> sp.)		x	1	1
	Bacteries	Fire blight	x		1	2
	Bacteries	Pseudomonas Blossom Blast and Dieback (<i>Pseudomonas syringae</i> pv. <i>syringae</i>)	x			1
	Fungus	Marssonina leaf spot - <i>Marssonina</i> spp.	x		2	
	Fungus	<i>Elsinoe piri</i> /Anthracnose spot on leaves and fruits	x	x	1	
	Fungus	Sooty Blotch		x	2	
	Fungus	Leucostoma canker - <i>Fusicoccum amygdali</i>	x		1	
	Fungus	Apple collar rot - <i>Phytophthora cactorum</i>	x		2	
	Fungus	Pear leaf spot - <i>Septoria pyricola</i> - <i>Mycosphaerella pyri</i>	x			2
	Fungus	Pear Brown Spots (<i>Stemphylium vesicarium</i>)				3
Fungus	Pear rust (<i>Gymnosporangium sabinae</i>)	x			2	
Pests		Rosy apple aphid - <i>Dysaphis plantaginea</i> / Pear aphids - <i>Dysaphis pyri</i>	x	x	1	2
		Codling moth - <i>Cydia pomonella</i>		x	1	3
		Apple Blossom Weevil (<i>Anthonomus pomorum</i>)	x		1	3
		Apple sawfly - <i>Hoplocampa testudinea</i>		x	1	3
		Brown marmorated stink bug - <i>Pentatomidae</i>	x		2	2
		Winter moth - <i>Operophtera brumata</i>			3	3
		<i>Stefanitis pyri</i>			?	3
		Psylla (<i>Cacopsylla pyri</i>)				2
		Pear Leaf Blister mite (<i>Eriophyes pyri</i> , <i>Phytoptus</i>)				1 - 2
		Sinuate Pear Borer (<i>Agrilus sinuatus</i>)				1 - 2
		Pear Midge (<i>Cantarinia pyrivora</i>)				1 - 2



InnOBreed – Co-Creation of Innovative solutions

Examples of participatory approaches (2/3)

'NOVAFRUITS'
Heritage & sharing innovation
Participative Organic Fruit Breeding



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The 52 private gardeners,
who are growing apple-
seedlings in our crow-
breeding-project, are
located in nearly all parts of
Denmark.

The "Pometum", the Danish
National Fruit Genebank



Examples of some of the preliminary selected cultivars

Examples of some of the 52 seedling-gardens



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InnOBreed – Co-Creation of Innovative solutions

Example of combine innovations (3/3)



The 52 private gardeners, who are growing apple-seedlings in our crow-breeding-project, are located in nearly all parts of Denmark.

The "Pometum", the Danish National Fruit Genebank

- **Analyse of the Existing Innovations**
 - **Biotechnic Innovation**
 - From **clonal** to a **populational** strategy for GR preservation
 - **Multi-actor participatory approach**
 - Participatory **GR preservation**
 - Participatory **breeding**



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InnOBreed

Take-home messages

GR anchored: valorization of GR to enhance the development of OF cvs
A targeted objective: highlight **EU regulation** consistency

Challenging project for valorizing FTGR

- Multi-actor approaches targeted on **Impact** assessment
- Multitrait approach
- **Case study based & public-private partnership**
- Connecting people & coordinated Networking

Integrating thematic approaches:

- **Ideotype – Multi-Trait – GxE** instrumented
- **Climatic Change – Fruit quality – Biotic stress** anchored
- **Actor oriented** (*Social innovations*)

Breaking point with classical breeding procedures



The 52 private gardeners, who are growing apple-seedlings in our cross-breeding-project, are located in nearly all parts of Denmark.

The "Pometum", the Danish National Fruit Genebank

The selected old Danish mother cultivars:



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Thank you!



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