Walloon Agricultural Research Center (CRA-W)

# FUNCTIONAL AGROBIODIVERSITY IN APPLE AND PEAR PEST MANAGEMENT IN BELGIUM


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**Belgium Agroecological meeting - BAM**

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# *Belgium context*

- Organic fruit production = intensive, high input
- Organic orchard : low functionnal biodiversity
- Pests and diseases cause a lot of economic loss

- Ask from vegetable growers to produce fruit

# *Objectives*

- Define new models for organic fruit and vegetable production under a fundamental redesigned cropping system
  - how optimise ecological services with adapted biodiversity ?
- Assess its sustainability under a long term field study
- Establish references and participate to a low-input fruit production european network
- Give suitable solutions for fruit growers

# *Objectives*

## 3 research projects started in the CRA-W

1. Innovative fruit-based agroforestry cropping systems: co-design and establishment in Gembloux
2. 'Eco-Orchard' CORE Organic+, FP7 ERA NET project, which Functional AgroBiodiversity (FAB) in orchards ?
3. Join project with the Rural Development Administration (RDA) of the Republic of Korea: comparison of type and abundance of beneficials in Belgium orchards under conventional and organic production systems

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# *1.fruit-based agroforestry*

## Participative co-building

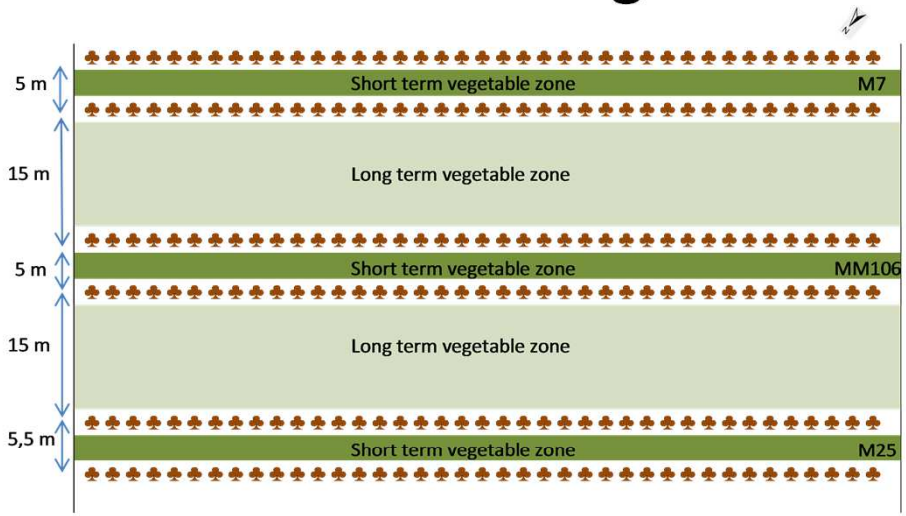
- Literature reviews and visits of pre-existent setups
- Proposals for different spatial arrangements and prototypes have been elaborated and evaluated through participative discussions  involving scientists, advisors and farmers,
- Links with genetic innovations for rootstocks and cultivars

## Main questions discussed

- How to optimize the ecological services ?
- How to adapt the mechanisation without limit plant interactions ?
- How to reach a high income per surface unit ?

# *1.fruit-based agroforestry*

An innovative organic fruit-based agroforestry cropping system, established in 2014 at Gembloux in Belgium




## Perspectives

Two on farm prototypes on two pilot farms

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# 2. EcoOrchard

## Eranet Core Organic plus

"Innovative design and management to boost functional biodiversity of organic orchards" (9 european countries)

- → InHort, **Poland**, Dorota Kruczyńska, Małgorzata Sekrecka
- → FiBL, **Switzerland**, Franco Weibel, Lukas Pfiffner, Claudia Daniel
- → INRA, **France**, Marc Tchamitchian, Arnaud Dufils, Servane Penvern
- → GRAB, **France,** François Warlop
- → Julius Kühn-Institut, **Germany**, Annette Herz
- → SLU, **Sweden**, Mario Porcel
- → VZ-Laimburg, **Italy**, Markus Kelderer, Josef Telfser
- → Latvian Plant Protection Research Centre, **Latvia,** Laura Ozolina-Pole , Baiba Ralle
- → CRA-W, **Belgium**, Laurent Jamar, Bertrand Pahaut
- → EcoAdvice, **Denmark**, Maren Korsgaard

*Starting point :* participative research group (INRA) :
"Verger durable" since 2007

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# 2. EcoOrchard

Growing flowers in order to gain more natural enemies, and hence reduce pest damage is a technique called Functional Agro-Biodiversity (FAB).

## 4 Objectives

1. To track innovations, collect existing knowledge, identify promising techniques, tools and monitoring protocols to improve management of FAB
2. To provide efficient user-friendly tools to assess the effects of biodiversity patterns on cropping system
3. To create a European-wide network of stakeholders for collecting, sharing and improving scientific and practical knowledge in FAB management:
4. To assess how far functional agrobiodiversity can reduce pest damage and pesticide use: flower strips in the alleyways of 12 apple orchards in 6 EC

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# 2. EcoOrchard

- A total of 34 techniques have been described
- → 3 categories: long-term ecological infrastructures, dynamic agricultural practices adaptable from a season to another (e.g.: to adapt inter-row mowing) and deeper system redesign requiring strong interactions with the production system (e.g.: crop diversification)
- First results in Belgium: beneficials are 2,1x higher in orchard with flower strip

2 flowers mixtures: ecotype >< commercial

# 3.Biodiversity study in orchards

## Comparison between conventional an organic pear orchards for beneficials

**Table 1: Biodiversity study in Belgium orchards - comparaison of the beneficial abundance and number of familly present in conventionnal and organic orchards - 24 beattings by orchards, 3 timing observations periods, results 2016**

| Date | | n | Total number of arthropod /24 beattings | Total number of beneficials/24 beattings | Mean number of arthropod familly by orchard/24 beattings | Mean number of beneficial family by orchard/24 beattings |
|---|---|---|---|---|---|---|
| 27/05/16 | Organic | 6 | 55,3 (19,6)* | 38,8 | 13,7 (2,2) a | 9,7 a |
| 27/05/16 | Conv | 6 | 31,7 (7,2) | 9,1 | 4,7 (1,6) b | 2,5 b |
| | Organic/Conv | | 1,7 | 4,2 | 2,9 | 3,9 |
| 23/06/16 | Organic | 6 | 70,8 (19,2) | 44,0 | 16,2 (4,1) a | 12,3 a |
| 23/06/16 | Conv | 6 | 32,2 (14,7) | 14,2 | 7,2 (1,2) b | 4,7 b |
| | organic/Conv | | 2,2 | 3,1 | 2,3 | 2,6 |
| 20/07/16 | Organic | 6 | 76,8 (16,6) | 54,8 | 14,5 (1,9) a | 10,8 a |
| 20/07/16 | Conv | 6 | 45 (20,8) | 18,1 | 6,5 (1,1) b | 4,8 b |
| | Organic/Conv | | 1,7 | 3,0 | 2,2 | 2,3 |
| **Mean for 3 dates** | **Organic/Conv** | | **1,9** | **3,4** | **2,5** | **2,9** |

* datas in brakets are standart deviation of the mean, datas with different letters are significantly differents

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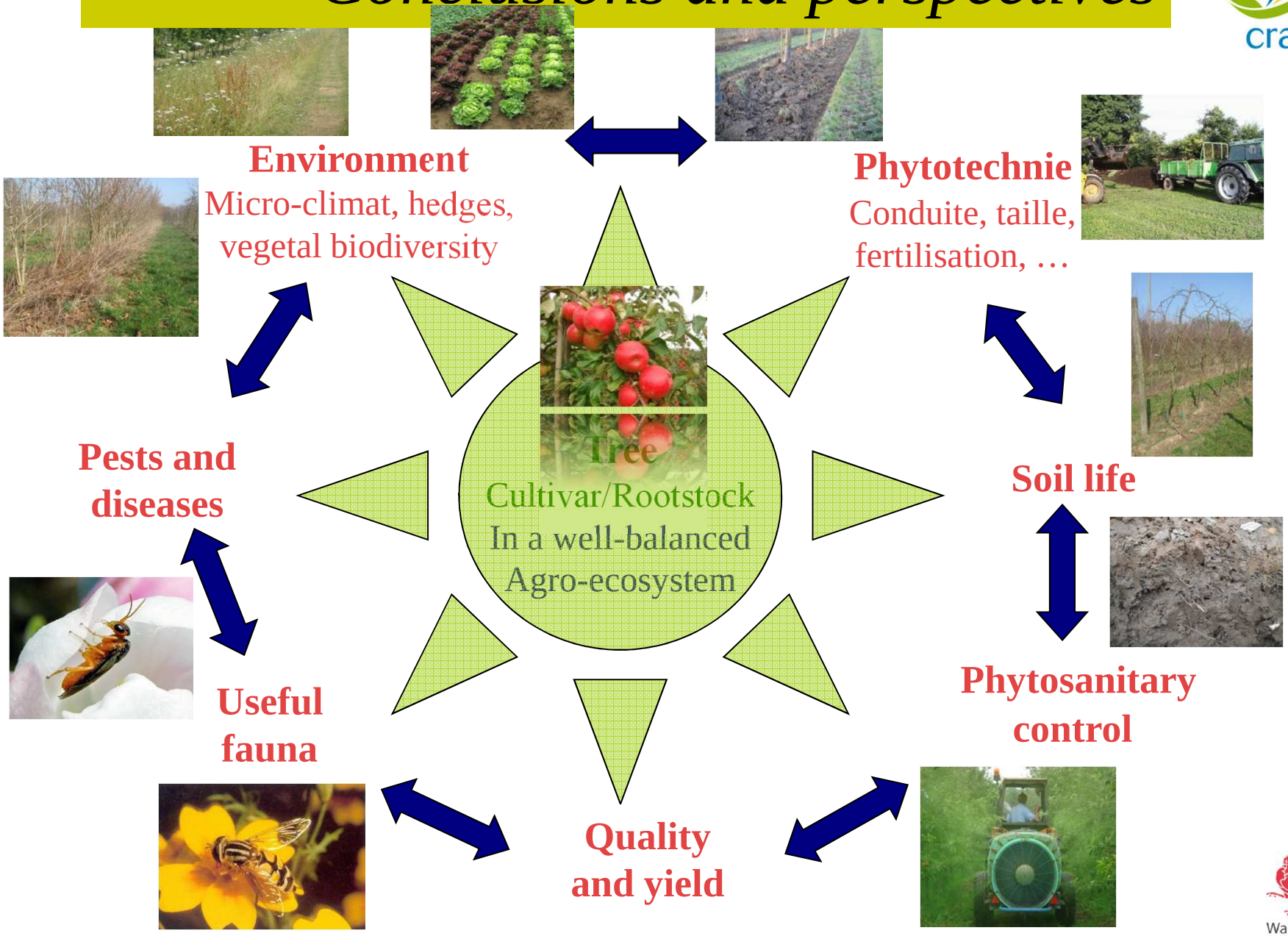
# *Conclusions and perspectives*

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Thank you for your attention