ReMIX

Redesigning European cropping systems
based on species mixtures

ReMIX brief presentation

Project start date: May 1st 2017

THIS PROJECT HAS RECEIVED FUNDING FROM THE **EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME** UNDER GRANT AGREEMENT N. 727217

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Species mixtures for redesigning European cropping systems

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1. ReMIX in a nutshell

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Title of the project: "Redesigning European systems based on species MIXtures"

Budget: €5 million funded by the Horizon 2020 Programme

Duration: 4 years, starting 1st May 2017

Coordinator: INRA (France)

Partnership: 24 partners in 11 EU countries, Switzerland and China

1. ReMIX in a nutshell

Project approach is three-fold

Transdisciplinary:

gathering partners with expertise in agronomy, agroecology, genetics, breeding, plant pathology, statistics, modelling, and social sciences

Value-chain:

addressing socio-technical and economic needs of stakeholder across the agrifood value-chain

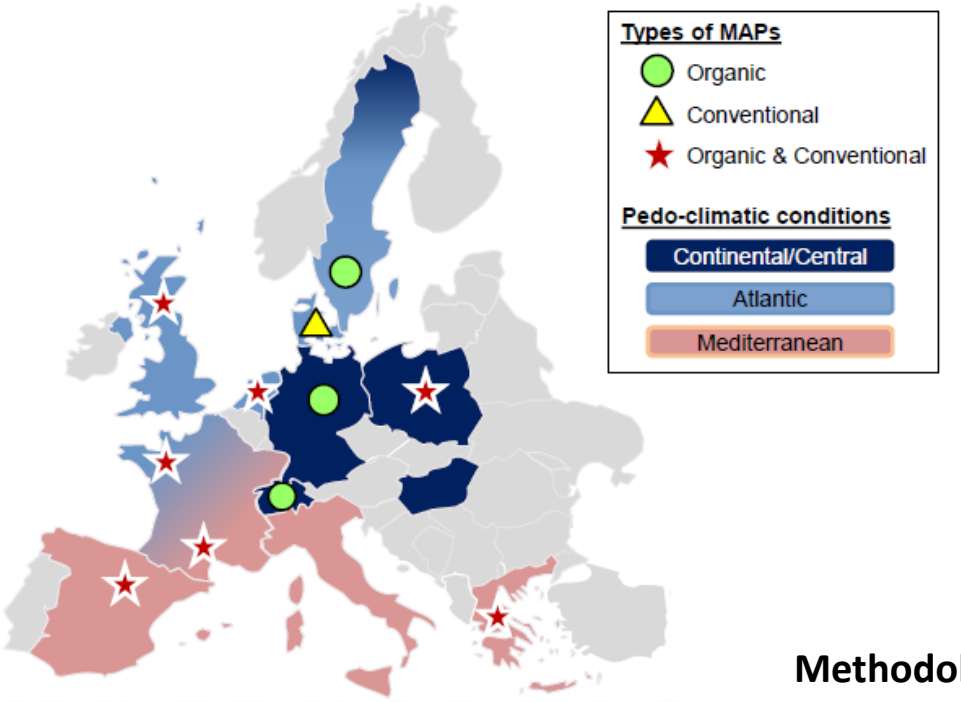
Multi-actor:

through the participation as partners of diverse organisations (research, technical institute/advisor centre, industry),

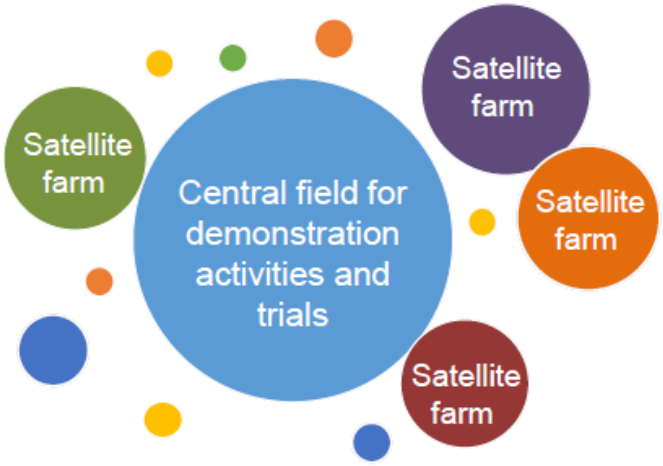
and the setting up of **Multi-actor Platforms** in 10 EU countries

1. ReMIX in a nutshell

Multi-actor approach through 11 Multi-Actor Platforms (MAP) in 10 EU



MAP Organisation



Methodology

M1 → M12	→ M24	→ M36	→ M48
Step 1: MAP establishment and analysis of problems	*Step 2: Co-design of preliminary solutions and first practical testing*	*Step 3: Second year practical testing for promising management*	*Step 4: Evaluation and validation of results and outreach*

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2. What are Species Mixtures studied in ReMIX?

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Species Mixtures – intercrops – crop associations – plant teams are different plant species growing simultaneously on the same field for a significant part of their growth cycle

ReMIX will study three types of species mixtures:

- ✓ **Cereal-grain legume bi-specific cash crops**, harvested at the same time and producing grains for human and animal consumption

- ✓ **Cereal cash-crops associated with non-harvested companion crops**, which can substitute chemical inputs

- ✓ **Relay intercrops,** involving the under-sowing of annual or perennial legumes into a cereal cash crop to avoid cereal competition for the legume

2. What are Species Mixtures studied in ReMIX?

Benefits of Species Mixtures include:

- ✓ Enhancement of ligt, water and nutrient (N, P) use efficiency
- ✓ Improvement of the control of pests, diseases and weeds
- ✓ Increase of crop productivity and resilience to biotic and abiotic stresses, including those triggered by climate change
- ✓ Reduced use of fossil energy and chemical inputs
- ✓ Enhancement of the provision of ecosystem services

Combinations studied in ReMIX, according to the interest of local actors will be:

Cereals: bread & durum wheat, barley, triticale and maize

Other cash crops: rapeseed, oats, sunflower

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Grain legumes: pea, white lupin, lentil, faba bean and soybean
Forage legumes: lucerne, clover, vetch
Companion species: perennial grasses (*e.g.* ryegrass)

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3. Project objectives & Work Plan

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3. Project Objectives & Work Plan

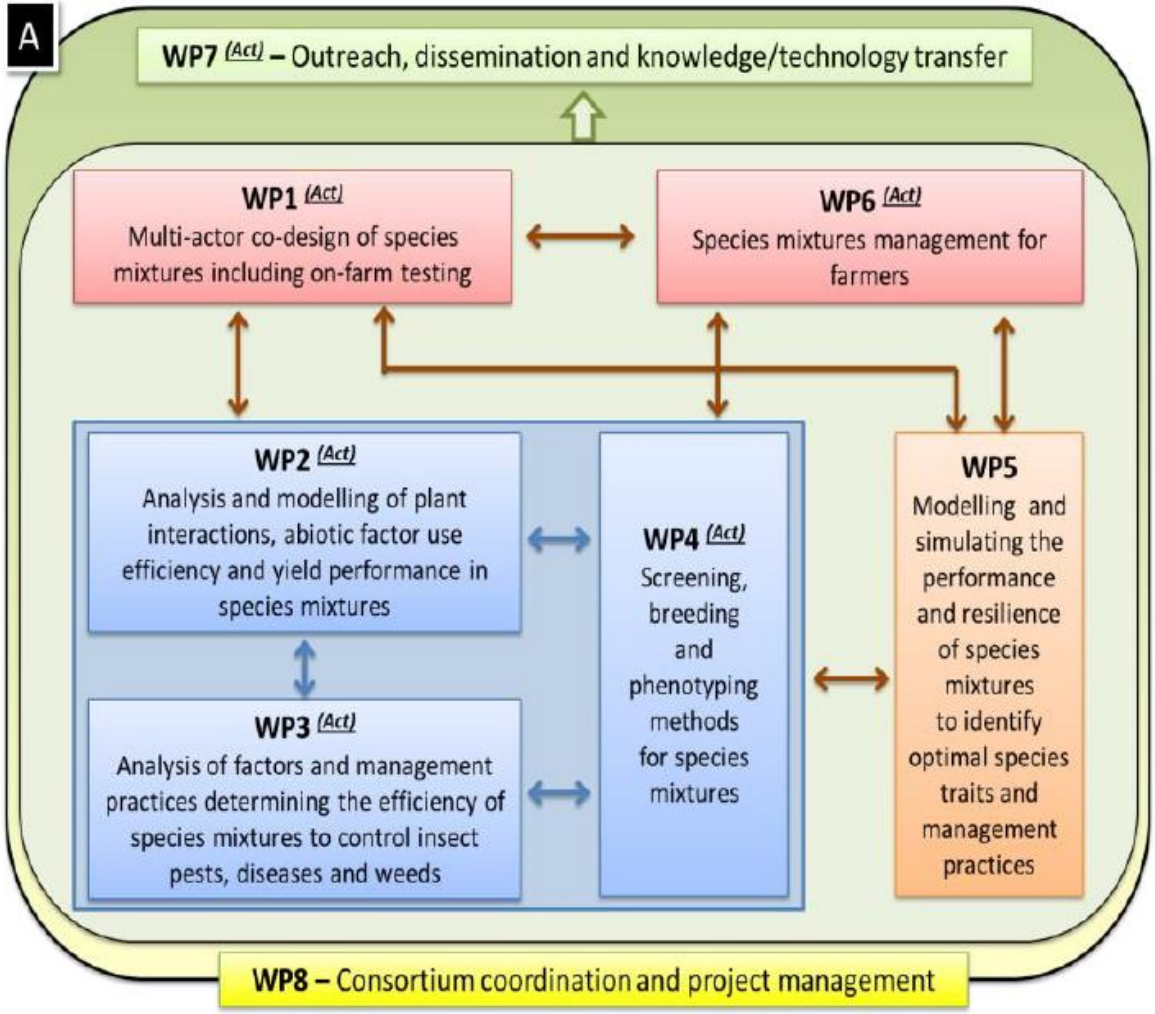
The **overall goal of ReMIX** is to **exploit the benefits of species mixtures** to design **productive, diversified, resilient and environmentally friendly** agro-ecological EU cropping systems **less dependent on external inputs** and acceptable/economically-efficient for farmers and actors in the agri-food chain.

More specifically, ReMIX will:

- ✓ **Overcome barriers** to stimulate the adoption of species mixtures
- ✓ **Unravel mechanisms** of plant-plant interactions for resource use efficiency
- ✓ **Determine the role of species mixtures** in controlling diseases, pests and weeds
- ✓ **Identify key plant traits** relevant to species mixtures for arable crops
- ✓ **Generate novel breeding material and methods** adapted to species mixtures
- ✓ **Demonstrate the role of species mixtures** in improving ecosystem services
- ✓ **Develop generic rules for assembling species** for efficient cash crop production using simulation models
- ✓ **Develop new management techniques** to optimise species mixtures performances
- ✓ **Optimise settings and specifications** for harvest machines and grain cleaning after harvest
- ✓ **Develop a tool box, an educational serious game and technical booklets**

3. Project Objectives & Work Plan

Relationships between Work Packages (WP)



The multi-actor approach in WPs

(Act): WPs where the multi-actor approach is implemented

B

Actors involved in WP1:
Farmers, farmer advisors, cooperatives and federations, processers

Input from actors:
- *Information on local agricultural practices, choice of species, crop management practices, barriers and needs*
- *Iterative cropping design*
- *On-farm testing of species*

Actors involved in WP6:
Farmers, farmer advisors and federations, technical institutes, machinery manufacturers

Input from actors:
- *Development of multi-criteria assessment tool*
- *Optimized management techniques for species mixtures*
- *Decision support game*
- *Development and testing of harvesting and grain sorting machines*

Actors involved in WP7:
Researchers, farmers, advisory services, technical institutes, breeders, agroindustry, machinery manufacturers

Activities for actors:
- *Workshops, best practice manuals, training sessions*
- *Trade fairs*
- *Conferences, final project conference*

Actors in WP2, WP3, WP4:
Farmers, breeders

Input from actors:
- *Identification of key genotypic traits and of ideotypes*
- *Development of breeding schemes*
- *Selection trials*
- *Field experiments*

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4. Outcomes & impacts

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OUTCOMES

Better understanding of barriers for adoption

Better understanding of species mixtures functioning

Novel scientific knowledge on mechanisms underlying plant-plant interactions and benefits

New genetic resources and identification of varieties

Validated simulation models

Optimised technical settings for existing machines

Readily accessible information for advisors & farmers

Advice to actors to overcome regulatory obstacles

END-USERS

Farmers, advisors

Policy makers, public authorities

Breeders, students, scientists, industry

IMPACTS

Increased use of species mixtures

Reduction of chemical inputs

Increased diversifica-tion in EU agriculture

New ntl' & EU **regulation**

5. Further info

TWITTER: @RemixIntercrops

Web site:
http://www.remix-intercrops.eu

FACEBOOK: RemixIntercrops

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