

WHEATAMIX Project

Increasing within-field wheat diversity to foster ecosystem services in the Parisian basin

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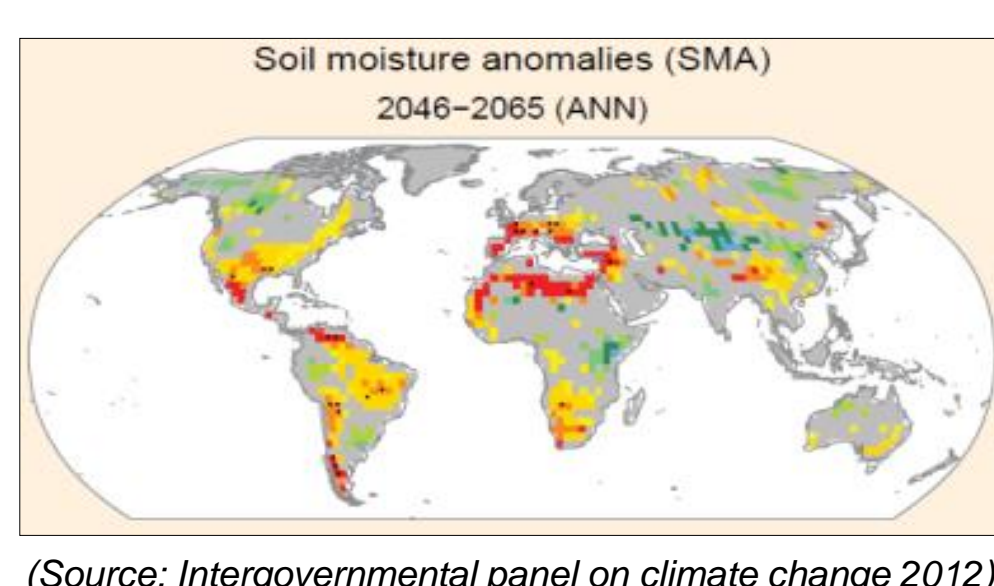
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Toward an increase in crop genetic diversity

During the 20th century, agriculture in developed countries experienced major gains in productivity via homogenization and intensive use of inputs. This model is jeopardized by the awareness of rapid **global change** and the need for greater **agricultural sustainability**.

Global change

More extreme climatic events



Decreasing inputs and pesticide use

Less environmental control



Increasing environmental stochasticity

Increasing genetic diversity to foster ecosystem services

Soil fertility

Biodiversity conservation

Pest & disease regulation

Yield potential & stabilization :

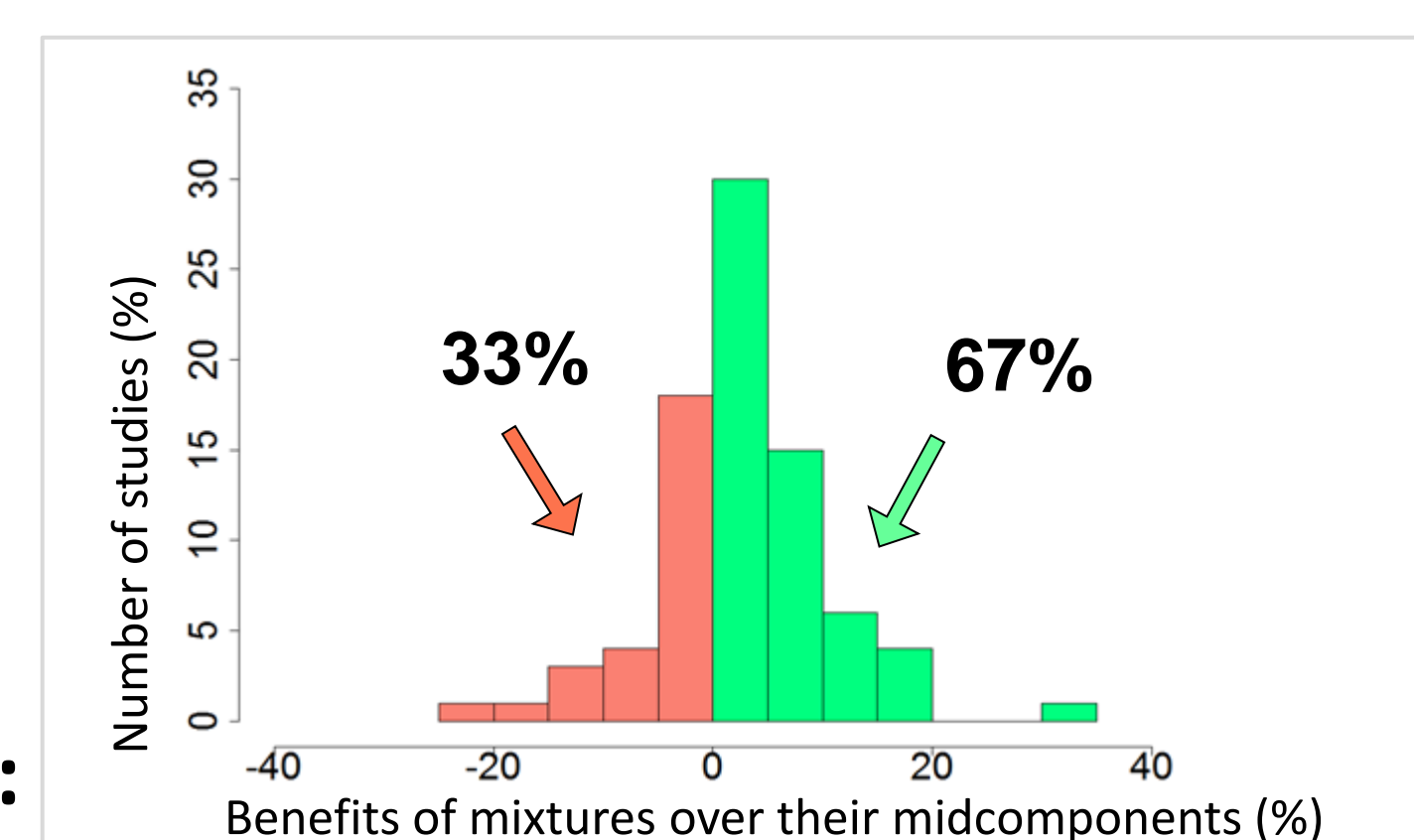


Fig 1 : Over-yielding of mixtures compared to their midcomponents

(C. Lecarpentier, Synthesis of 83 observations collected from Baker 1977; Smithsonian and Lenné 1996; Gaillard et al. 2001; Essah and Stokopsf 2002; Mundt 2002)

Variety mixtures for a sustainable and multifunctional wheat production

WHEATAMIX focuses on wheat, the major cereal of the production basin of Paris, and aims to better evaluate the possible roles of within-crop genetic diversity to reinforce the multi-functionality and resilience of cropping systems under global change. The **multidisciplinary research** involves scientists (in genetics, agronomy, ecophysiology, economy, management...) and stakeholders ("Chambres d'Agriculture" and farmers). It is structured in four work-packages with **complementary approaches**:

WP1: Traits and genetics of wheat genotypes

Varietal traits and genetic variability, trait response of genotypes in blends

WP2: Linking variety traits to agroecosystem functioning and services

Ecosystem services provided, trade-offs/synergies among services, links between groups of services and variety traits

WP3: Blend impacts on the wheat supply chain

Techno-economic and environmental performances of blends, bases of blend choice and their impacts on the wheat supply chain

WP4: design rules and breeding schemes for blend development

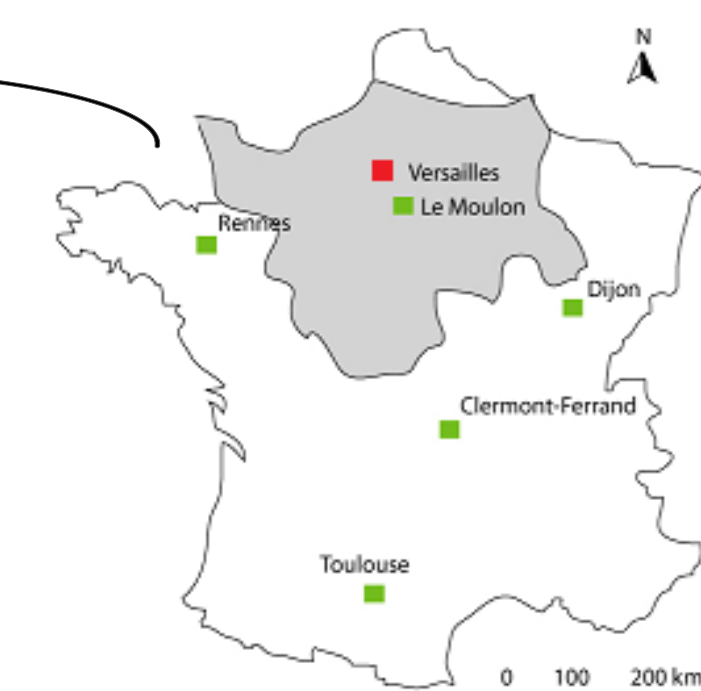
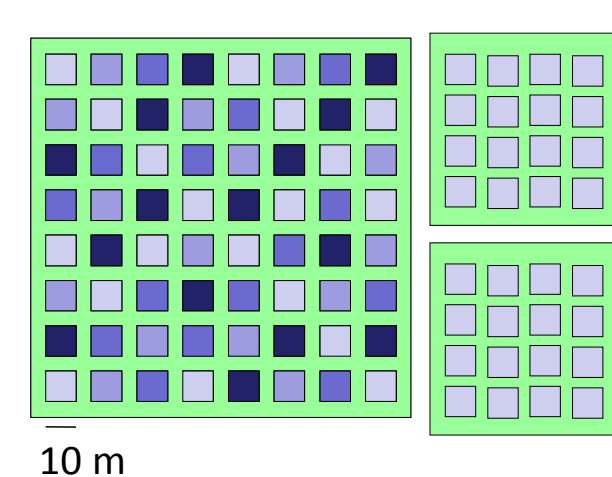
Scenarios of blends development in the Paris Basin, rule design and breeding schemes for blend production, result and guideline dissemination

Diverse experiments allow to evaluate **blends in the field**:

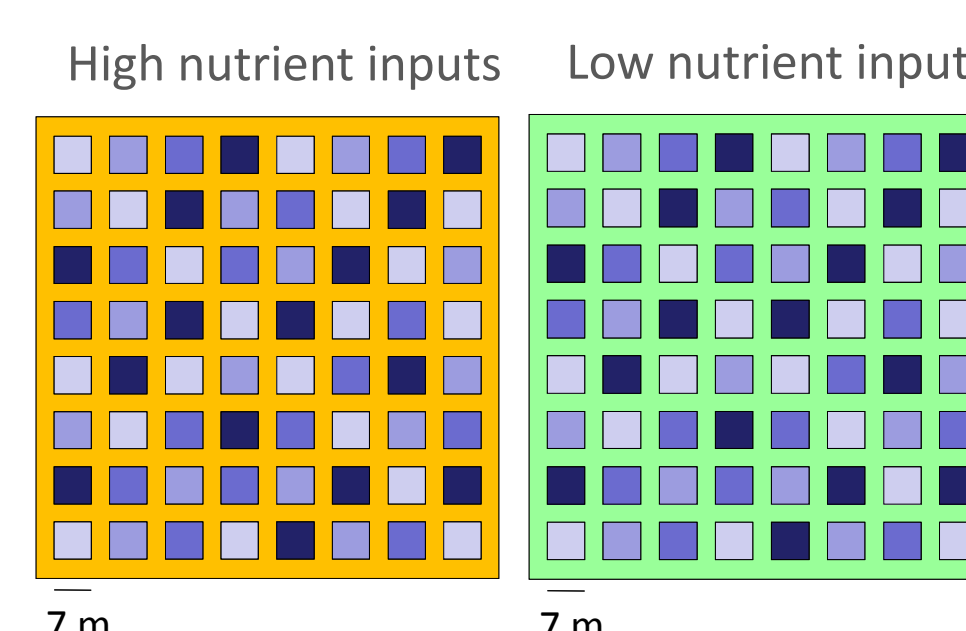
On test plots...

Main diversity experiment

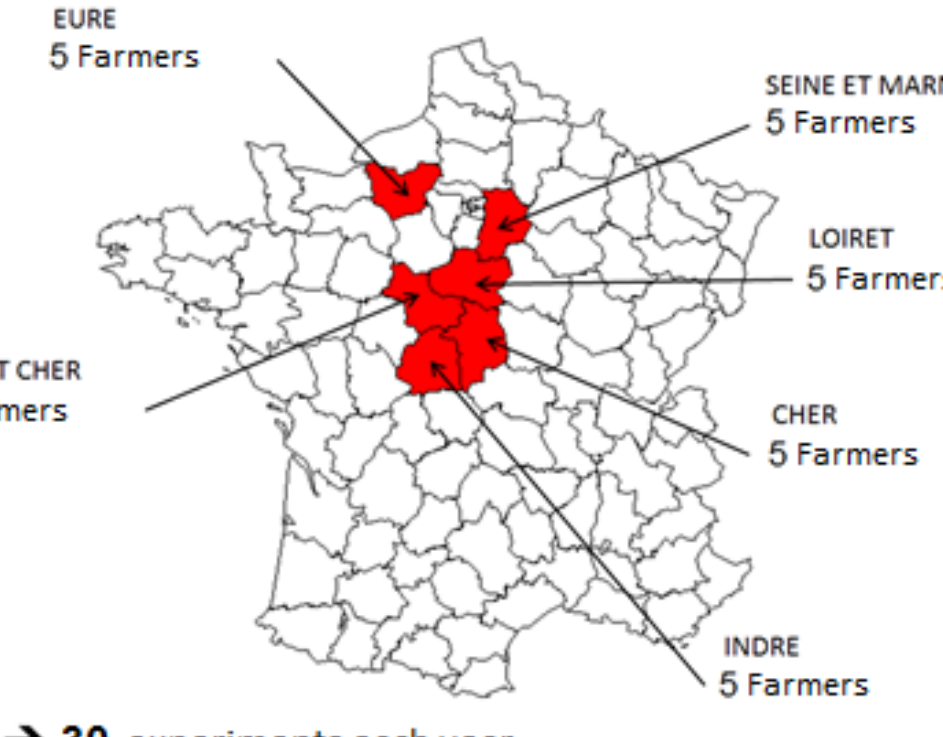
Diversity level:	16 genotypes
1 (16 plots)	2 (24 plots)
4 (28 plots)	8 (20 plots)



Multisite experiment



... and in farms !



→ 30 experiments each year

On the way to define association rules to design optimized wheat blends

In its first year, Wheatamix has developed an in-depth **phenotypic characterization** of a panel of 60 lines and selected the 16 more representative genotypes to study them in association. The selection was based on the clustering of functional traits that affect aspects of agroecosystem functioning, 4 groups of traits (each including 4 varieties) allowed to deduce the components of wheat variety diversity.

The parallel **ideotyping exercise**, performed by scientists and advisers from Chambre d'Agriculture, pointed out some **key rules for blend design**, and highlighted the importance of the production context for targeting baskets of services.

Through its holistic approach from wheat traits to blend performances, Wheatamix aims at documenting the potential impact of cultivar mixtures on the **wheat supply chain**, and at building **scenarios** for their development in the Paris Basin.