

Assessment of locally adapted wheat variety mixtures

Problems

A growing number of organic farmers cultivate **variety mixtures** for their ease of use and their ability to buffer stress and environmental heterogeneity. Farmers have to **choose the varieties for designing their mixtures**, but few guidelines have been proposed so far.

In the case of **winter wheat**, mixtures are usually assembled primarily based on yield. It is advised to mix varieties with **complementary levels and sources of foliar disease resistances** and to maintain homogeneity of **maturity** to ensure good quality. **Other varietal characteristics** might be considered, but very little is known about plant interactions within mixtures.

Furthermore, variety mixtures could also offer the possibility to finely tune the varietal choice to **local context**.

Solutions

Co-design of assembly rules

To guide farmers with optimised composition mixtures, it has been proposed to identify **assembly rules** for combining mixtures components¹. Thus, a **participatory approach** based on workshops was suggested as particularly suitable for designing locally adapted mixtures. Here, we adapted this approach to organic farming with **eleven organic farmers** from the Ile-de-France region (GAB IdF). Farmers, researchers and technical experts **exchanged knowledge** on how to design mixtures, in accordance with farmers' practices and local environmental conditions.

On-farm evaluation of farmers' mixtures

The assembly rules were mobilised for **co-designing farmers' mixtures**. These mixtures were evaluated **on-farm, in a stripe design** allowing for comparisons with the corresponding varieties in pure stand (Fig.1). Over the three years (from 2016 to 2018), **17 mixtures** were evaluated. They showed a mean **yield gain of 4.8%** compared to the means of their pure stand components. The mixtures also stabilised the **protein content**.



Figure: Stripe experimental design

Further information

1. The assembly rules are currently being validated and integrated in a **multi-criteria assessment tool** to help farmers designing mixtures tailored to their terroirs: <http://moulon.inra.fr/optimix/>
2. Barot et al 2017. Designing mixtures of varieties for multifunctional agriculture with the help of ecology. *Agron. Sust. Dev.* 37: 13.
3. Wheatamix project: https://www6.inra.fr/wheatamix_eng/
4. CASABio project: https://www6.inra.fr/basc_eng/Research/Innovation-in-partnership/CASABio
5. Emma Forst 2018 (PhD thesis): <https://tel.archives-ouvertes.fr/tel-02114929>

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