On-farm breeding for wheat mixtures

Problems

In recent years farmers showed a growing interest in **cultivating wheat variety mixtures**, and in **selecting on-farm** populations that are adapted to the local context. However, **many practices exist for creating and breeding for mixtures**: from mixing a small number of carefully chosen cultivars, to mixing a large diversity which perform well in the farm, selecting within cultivars before mixing, selecting within the mixture, adding cultivars over the years, … Understanding the impact of different selection practices on mixtures behavior, should help farmers breed their own adapted mixture on farm.

Solutions

Three selection practices were identified and compared using a 3-year experimental design: two years of selection within components before mixing (M1); one year of selection within components, mix these selection and one year of selection within this new mixture (M2); and two years of selection within the mixture. The selected mixtures were compared to the non-selected mixture (M4). Each farmer created mixtures from the components of his/her choice. Results showed a **larger response to selection for some productivity and morphological traits when selecting within the mixture** (M3), with a tendency **to conserve more diversity when selecting within components before mixing** (M1).Gains obtained with selection depended mostly on farmers' selection intensity.

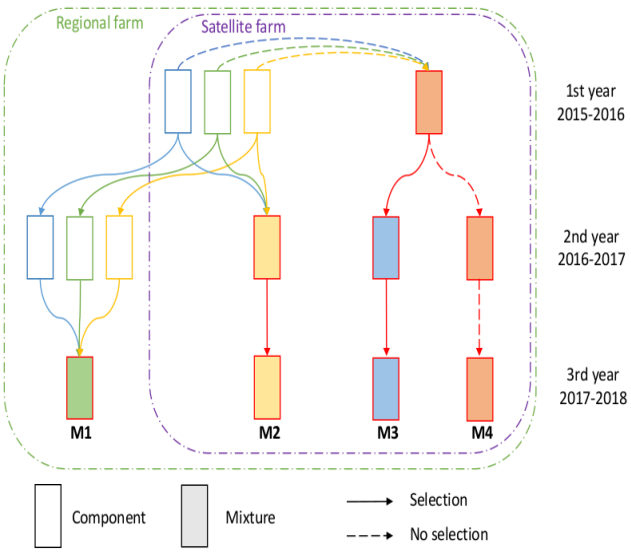

Figure: *Scheme of the 3-years experimental design to compare mixtures selection practices*

Practical

- Grow different cultivars, landraces and populations over two or three years to choose the ones adapted to your objectives.
- Determine your constraints in terms of cultivars, time and machinery: need for specific characteristics, possibility to sow multiple plots to select within components ...
- Identify the assembly rules (PA#19) and practices that are adapted to your breeding goals and constraints: select within the mixture to obtain a quicker response to selection or select within components if your goal is to conserve more diversity.

Further information

The experiment was co-constructed with farmers from the Réseau Semences Paysannes in France.

1. PA#19 Co-design of locally adapted wheat variety mixtures
2. Gaëlle van Frank 2018 (PhD thesis) www.theses.fr/2018SACLS525

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