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Participatory study on the selection of blends of cereal populations

This information sheet describes the procedure and results of a participatory research project on the selection of blends of cereal populations that meet the aims and needs of participating farmers.

Context

For a number of years now, farmers of the Rete Sementi Contadine ("Farmer Seed Network") have cultivated population blends which they create on site while investigating the best selection method for such blends. This experimentation was conceived with the aim of studying the impact of certain selection practices – which have been identified through interviews – on the behavior of the blends. The experiment was conducted in the context of a participatory study. In this context, several farmers, agricultural operators and researchers collaborated in each stage of the project, defining research questions, creating test protocols, organizing and managing tests on farms, recording observations, collecting data and interpreting results.

Protocol

Three selection procedures were identified, and over the course of three years an experimental protocol was developed in collaboration with the farmers (Figure 1). The practices which were identified and tested are: (i) selection from the component populations before blending (Procedure 1), (ii) selection from the blend (Procedure 3), and (iii) selection both before blending and after creating the blend (Procedure 2). The blends obtained are compared to the one that is not subject to massal selection. About 15 farmers participated in testing between 2015 and 2018, creating roughly 20 blends made up of from 2 to 15 components of their choice. Measurements of the wheat were taken in the field (height and length of the ears) and after the wheat was harvested (form and weight and of the ears, weight of one thousand grains, protein rate). The data were entered into the ShiNeMaS (Seed History and Network Management System) database [https://sourcesup.renater.fr/projects/shinemas/] and were analyzed with the PPBstats package on R software [https://github.com/priviere/PPBstats].

Results

This protocol allowed farmers to create and select a great diversity of blends on their farms, ones that are suited to their aims and needs: blends resistant to bending or which combine varieties with different characteristics, such as yield and protein rate. Comparison of the behavior of the blends with that of their respective components revealed that the former showed improvements in certain categories with respect to the average of the components (ear weight and length, average number of grains per ear). At the same time, the blends had a lower risk compared to sowing with a single component variety, in the context of not being able to predict growing conditions during a particular year: very few blends had values less than those of their weakest component variety. Plants from blends had the tendency to produce more and smaller grains.

In spite of using different selection practices and criteria, on the whole farmers selected ears from populations and blends which had quantitatively more and heavier grains. The two-year process of selecting from blends allowed farmers to obtain better feedback in selecting for plant height, ear weight and average number of grains per ear; yet for these same characteristics, the phenotypic diversity of the blend tended to be better preserved when selection was made from the component varieties before creating the blend. Farmers admitted that they sometimes encountered difficulties in selecting both from the blends (fear of losing diversity as they made selections) and from the components (the choice of plants to be selected was more difficult because of less phenotypic diversity).

Future prospects

These results will enable farmers who intend to select their blends at their farms to choose the selection practices best suited to their individual aims: while one procedure may allow for quick feedback with regard to a certain selection, another might permit the diversity of the component varieties to be better preserved. An initiative is currently underway which aims at producing support mechanisms for spreading the information obtained through this experimentation to farmer associations and to individual farmers, and for jointly developing a method for the collective creation and management of population blends suited to local contexts and to the aims of the farmers involved.

References

Figure 1: G. van Frank, scheme of three-year experimental procedure. Rectangles represent the lots (full: blend; blank: component), while arrows indicate massal selection (unbroken line) or multiplication without massal selection (dotted line). 2018.
Figure 2: G. van Frank, photograph of participatory selection tests on blends of cereal populations. 2018. CC BY NC SA

Additional information:

van Frank, G. “Gestion participative de la diversité cultivée et création de mélanges diversifiés de blé tendre à la ferme.” PhD thesis, Paris-Saclay, 2019.

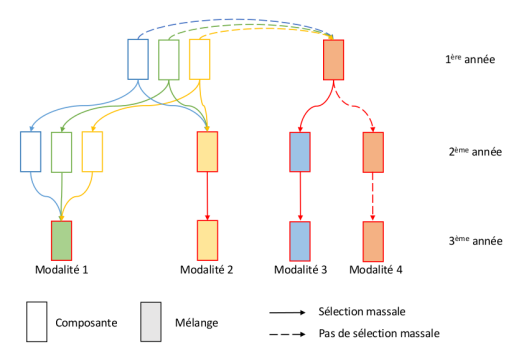

Figure 1

Figure 2