

Latest Research Results



Agronomic performance, resilience and baking quality of wheat cultivar mixtures adapted to organic management in Eastern Canada

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Varietal blends are the subject of abundant literature and are often presented as a promising agroecological practice.

Despite their low level of adoption by agricultural producers, it is a practice that would benefit the whole sector, as it promotes system resilience by maintaining natural genetic diversity. With climate change, agroecosystems need to be better designed to cope with stress and adapt to change, additionally, the design of resilient food systems is in the best interest to all. The concept of varietal mixtures can be applied to all crops, wheat included. In Canada, wheat production is mainly located in the west, where climatic and agronomic conditions contrast greatly with those in the east, strongly influencing varietal behavior. The aim of this project was to develop and compare organic wheat blends based on agronomic and baking quality criteria under eastern Canadian climatic conditions. The main traits and characteristics selected for were, yield and yield stability compared with pure lines, lodging resistance, disease resistance, baking quality of the mixtures, quality stability over time, and the timing of maturity for the varieties in the mixture. Competitiveness against weeds was also observed, as we had discovered the variability of this specific trait in advanced lines in previous studies.

The project was carried out in close collaboration with Moulins de Soulanges. The industrial partner has preferences based on its own tests carried out in their laboratory in order to make purchasing decisions. Potential preferences include bread-making properties, taste, odor, water absorption, bread volume and wheat cost. However, there is an inverse relationship between the most promising bread-making characteristics and the most favorable disease and agronomic characteristics. Varietal blends therefore aim to exploit the complementarity relationship between varieties in order to maximize the potential of each.

Trials were conducted at the R&D teaching farm located at the Institut National d'Agriculture Biologique in Victoriaville in Centre-du-Québec between 2018 and 2022, and at the Biochemin inc. farm located in Saint-Pie in Montérégie in 2021 and 2022. During this 5 year project, the research team evaluated 17 individually-sown varieties, 26 binary mixes, 6 three-component mixes, 3 four-component mixes, and 2 six-component mixes. Each year, the varieties and mixtures were evaluated in a complete randomized set-up with three replicates. Quality tests were carried out on each sample by the industrial partner.

Variability in climatic conditions has been a challenge throughout this project, because of the lack of moisture and low disease levels. However, we have made progress over the years as a result of our multi-criteria evaluation of the mixtures, with several mixtures showing potential combining both agronomic and baking qualities. When choosing varieties and developing blends there were multiple and complex factors to be considered. Due to this complexity and limited budgetary resources, it was necessary to restrict the number of treatments evaluated, therefore difficult decisions had to be made.



In conclusion, a commercial potential exists for variety blends in Eastern Canada, but this work still needs further development based on the results. After five years, we are able to offer our industrial partner information on the performance of several mixtures based on 2, 3, 4 and 6 varieties. This information has potential for two major groups of players in the wheat supply chain; the grain buyer and the grain grower. The grain buyer (such as La Milanaise and Moulins de Soulanges) first learns which varietal blends would offer interesting performance in breadmaking, but the grain grower may also be informed that a seed blend of two or more varieties brings yield and quality stability that may be attractive to grain buyers. In the years to come, potential commercial interactions between seed companies, growers and grain buyers could enable some of the mixtures studied to enter a future tradition of cultivating mixtures of varieties. To encourage adoption of the practice on farm, it will now be necessary to test the most promising mixtures on a larger scale.



Photos of the plots in Victoriaville taken on July 13, 2022 (a) and August 17, 2022 (b) and photos taken in Saint-Pie on July 28, 2022 (c) and August 13, 2022 (d).

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