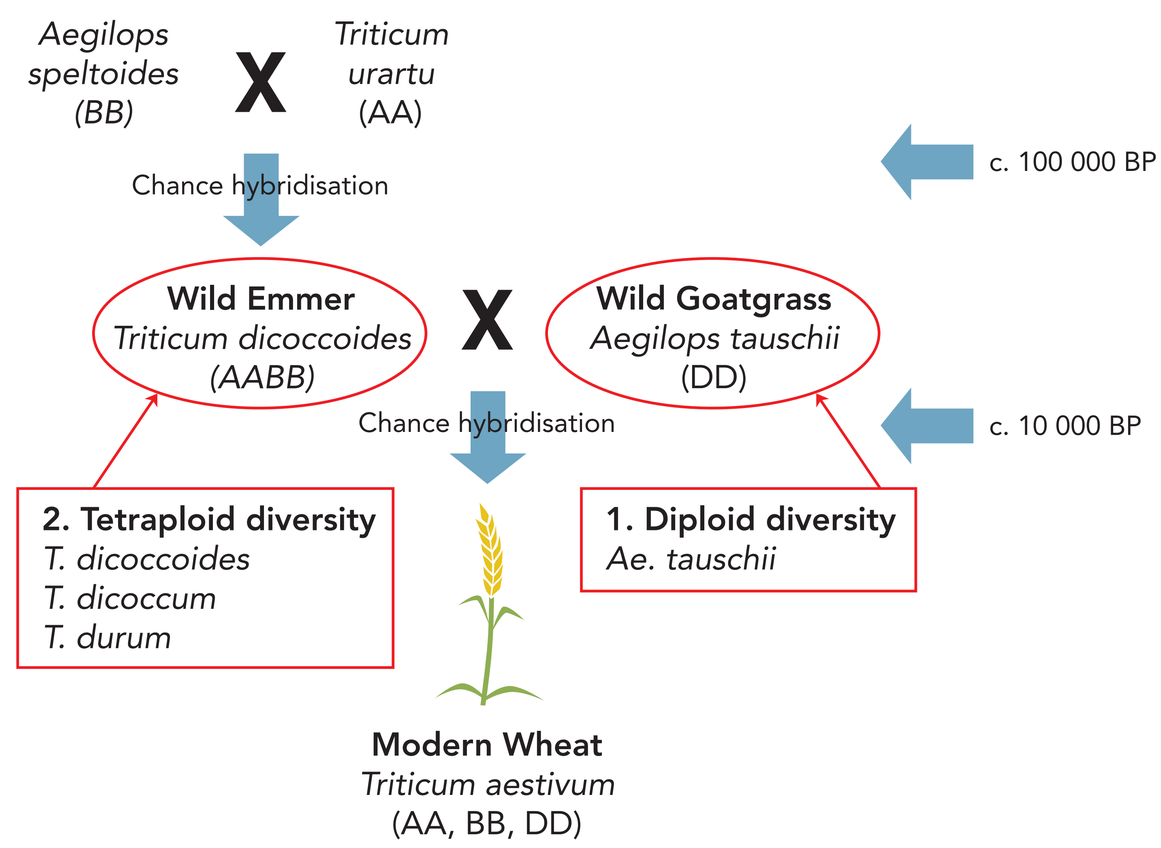
Plant Science into Practice

DIVERSITY-ENRICHED WHEAT

Niab pre-breeding research captures novel genetic diversity from the close relatives of wheat. All modern hexaploid wheat varieties trace back to a chance hybridisation 10,000 years ago between a primitive tetraploid wheat, wild emmer, and the related diploid species, wild goatgrass (Figure 1). Further intercrossing since then has also occurred between tetraploid and hexaploid wheats. By recreating these ancient crossing events, Niab has introduced genetic diversity from diploid and tetraploid relatives into a suite of pre-breeding lines in UK-adapted backgrounds.

Figure 1. The origin of modern wheat



Thousands of these diversity-enriched pre-breeding lines have been grown in the field (Figure 2) as part of the BBSRC-funded Designing Future Wheat (DFW) project. In replicated trials, many lines outyielded parent variety 'Robigus', with several yielding at much higher levels. Breeding companies have taken the best lines into their own commercial programmes.

New projects are also exploring novel leads for disease resistance and climate resilience traits. In field trials at Niab's trials site in Devon, we are identifying promising sources of resistance to *Septoria tritici* blotch (Figure 3), through the Delivering Sustainable Wheat (DSW: BBSRC) and Wheat Genetic Improvement Network (WGIN: Defra) projects. Niab is a partner in 'Wheat Alliance', an international project looking at the complex interactions between wheat roots and the soil microbiome (Novo Nordisk Foundation). This initiative aims to improve nutrient uptake, reduce environmental stress, and boost wheat production, especially in low-input farming systems.

Figure 2. Niab diversity-enriched wheat material

Figure 3. 2025 Septoria trials at Dartington in Devon

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UKRI Biotechnology and Biological Sciences Research Council
DFW
DSW DELIVERING SUSTAINABLE WHEAT
Wheat Genetic Improvement Network