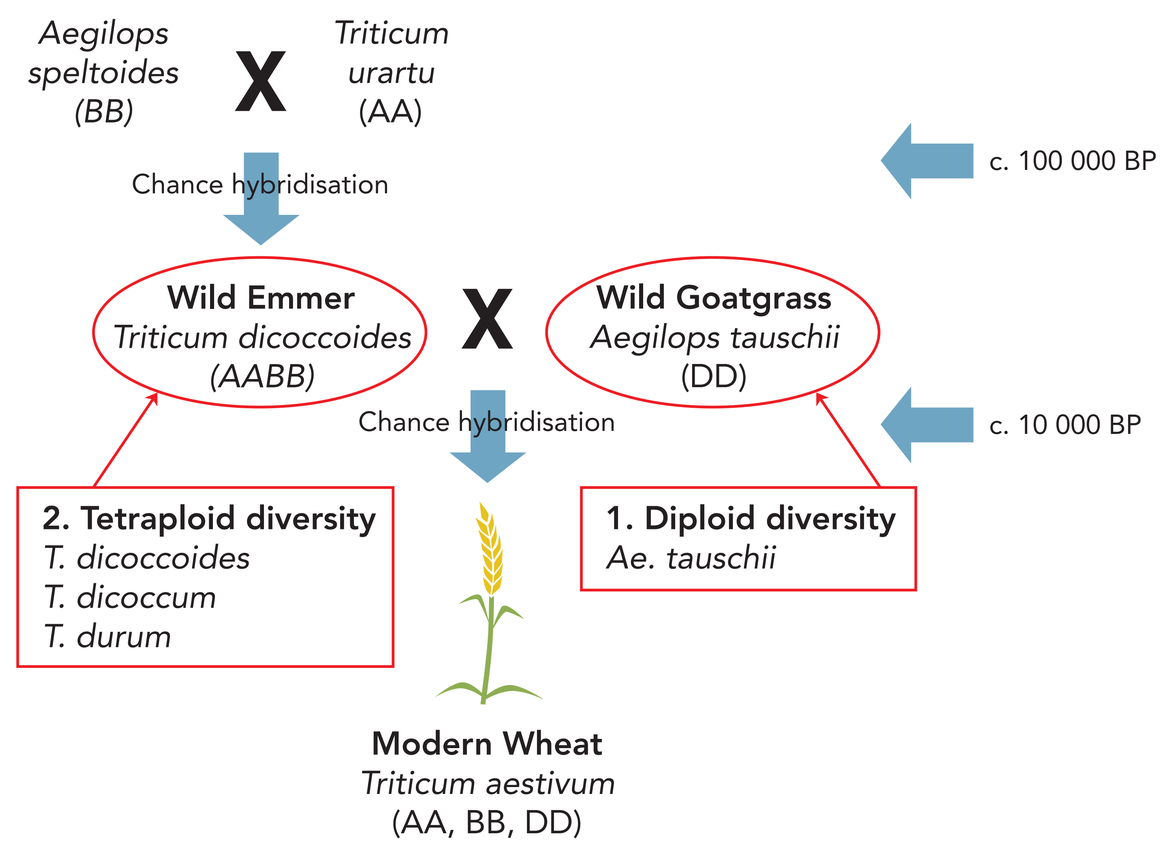
Plant Science into Practice

DIVERSITY-ENRICHED WHEAT

Niab's 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 between tetraploid and hexaploid wheats has occurred since then. 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 varieties as part of the Designing Future Wheat project.

Figure 1. The origin of modern wheat



Thousands of these diversity-enriched pre-breeding lines have been grown in the field (Figure 2). In trials, many lines outyielded parent variety 'Robigus', with several yielding at much higher levels. Breeding companies have taken interesting lines into their own commercial programmes, where they act as parents or grandparents of new wheat lines, helping to develop new varieties.

Niab is exploring novel leads for disease resistance and climate resilience traits. With the BBSRC funded Delivering Sustainable Wheat and Defra funded Wheat Genetic Improvement Network, we are identifying promising sources of resistance to Septoria tritici blotch (Figure 3).

Niab is a partner in the 'Wheat Alliance' (Novo Nordisk Foundation), an international project that aims to understand the complex interactions between wheat roots and their associated microbiomes. The ultimate goal is to enhance crop breeding strategies and advance sustainable agricultural practices to meet global food security challenges while reducing environmental impact.

Figure 2. Niab diversity-enriched wheat material

Figure 3. 2025 Septoria trials at Dartington in Devon

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