

# 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 the primitive tetraploid wheat, wild emmer, and the related diploid weed, wild goatgrass (Figure 1). Further crossing has also occurred since then, between tetraploid and hexaploid wheats. By recreating these ancient crossing events, NIAB has introduced genetic diversity from tetraploid and diploid relatives into a library of pre-breeding lines in an elite (winter wheat Robigus) background.

As part of the BBSRC-funded *Designing Future Wheat* (DFW) project, thousands of diversity-enriched pre-breeding lines have been grown at NIAB, with plant breeders invited to make selections and use this material in their own programmes (Figure 2). The most promising have been advanced to further testing within the new *Delivering Sustainable Wheat* project (DSW). Yield trials have identified many NIAB lines which outyield Robigus, with several yielding at much higher levels. NIAB is exploring how this yield improvement is constructed, to identify novel sources which can hopefully stack on top of the traits that breeders have already assembled.

NIAB is also interested in identifying novel leads for disease resistance. For example, it has shown that many of our lines carry the *Yr28* yellow rust resistance gene and that this improves resistance in typical UK field conditions. Within DSW, a series of field screens are running at NIAB's Devon trials centre to explore promising sources of resistance to *Septoria tritici* blotch (Figure 3).

Figure 1. The origin of modern wheat

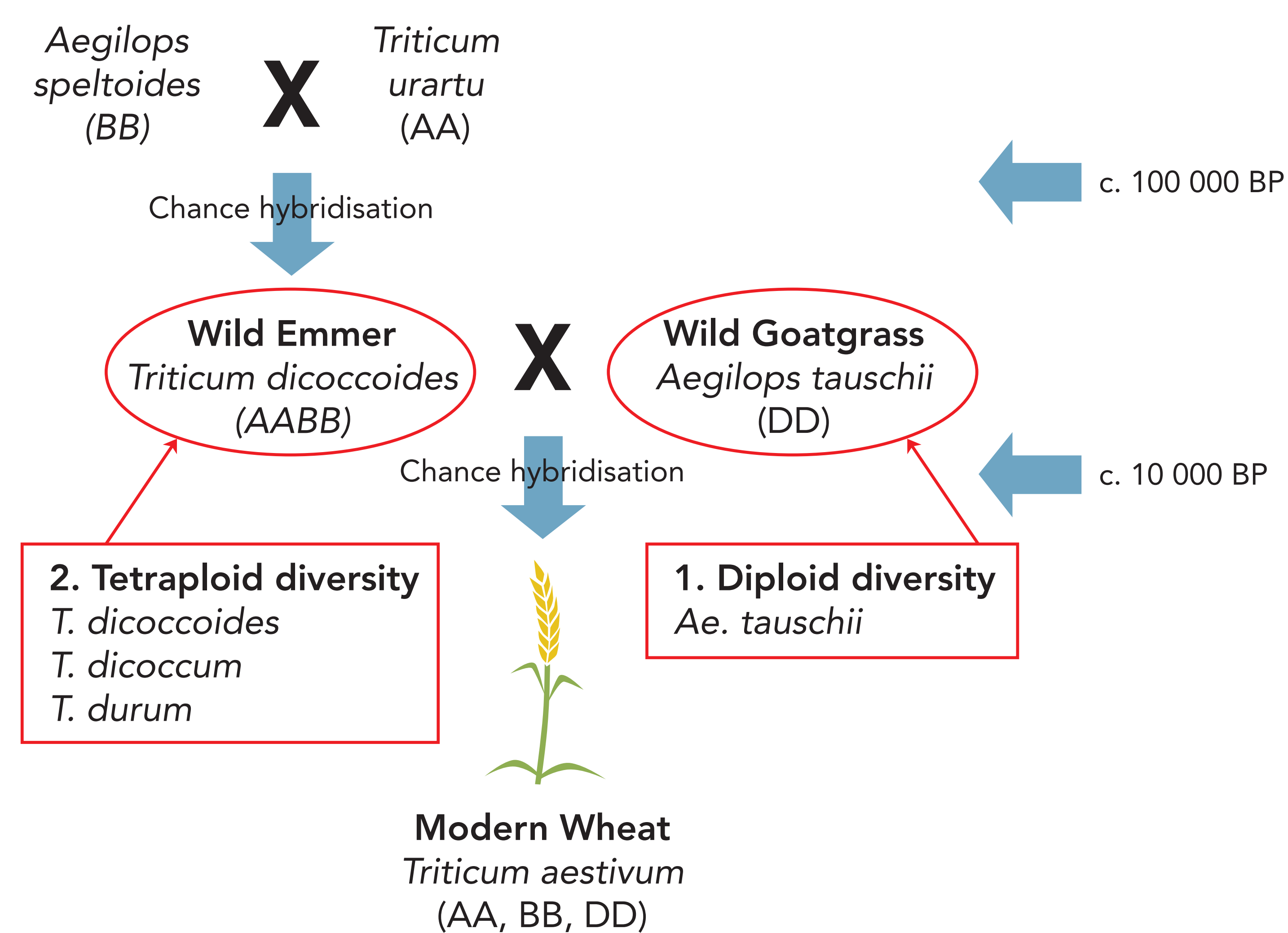


Figure 2. NIAB diversity-enriched wheat material



Figure 3. Contrasting STB resistance in NIAB pre-breeding collection: susceptible (a, b) and resistant lines (c, d)

