**Supplementary Material S25**

**Additional findings of the FISH analysis**

The number of Spelt-1 sites in *T. araraticum* ranged between two and seven per haploid genome, 4.72 on average (Supplementary Table S26). Over 95% of *T. araraticum* and all *T. timopheevii* genotypes carried Spelt-1 sites on 4GL and 5GL. About 75% of *T. araraticum* and all *T. timopheevii* possessed Spelt-1 site on the satellite of chromosome 6AtS, but the signal size was highly polymorphic. Spelt-1 signals on 1GL, 2GL and 6GS were frequent in both *T. araraticum* and *T. timopheevii*. Frequencies of signals in ‘rare’ positions were lower and ranged from 6.9% (7GL, 6GL) to 33.7% (2AtL).

The patterns of Spelt-1 and Spelt-52 repeats varied across geographic regions and between chromosomal groups. Genotypes lacking the Spelt-1 locus on 6AtS originated mainly from northeastern Iraq (Dahuk, Sulaymaniyah), and Eastern Turkey (two regions). The Spelt-1 locus on 2AtL was absent in Transcaucasia and Erbil (Iraq). It was rare in Turkey, present in approximately half of the genotypes from Iran, Sulaymaniyah (Iraq), and Syria, and always present in *T. araraticum* from Dahuk (Iraq) and in *T. timopheevii*. The Spelt-1 signal on 6GS occurred in Transcaucasia, ARA-1 genotypes from Turkey and in about ¼ of *T. timopheevii*.It was rarely found in Iraq and was absent from the Iranian group. The Spelt-1 signal on 2GL varied significantly in size (Supplementary Table S24). Usually, it was present in high frequencies in *T. araraticum* from Erbil, Iraq (62.5%), and less frequently in Iran and Turkey (33.3%). This locus was rare in Transcaucasian ARA-0, whileall *T. timopheevii* carried a large Spelt-1 site on 2GL. The medium-to-large signal on 3GL occurred mainly in Iran and Sulaymaniyah (Iraq). The Spelt-1 signal on 6GL was found in only six genotypes, five from Sulaymaniyah (Iraq) and one from Syria. One very large Spelt-1 signal on 7GS was observed in several ARA-0 genotypes from northeastern Iraq and in few ARA-1, while the signal on 7GL was found in the ARA-1 group only (Supplementary Figure S23). Spelt-1 signals at these ‘rare’ positions were not observed in *T. timopheevii.* The ARA-1 lineage was characterized by a higher number of Spelt-1 sites (5.38 in average) compared to ARA-0 (4.52) due to a more frequent occurrence of loci at 6AtS, 1GL, 6GS, and 7GL (Supplementary Table S25, Supplementary Table S26), whereas the loci 2AtL and 2GL were less frequent. The frequency of Spelt-52 sites in *T. araraticum* varied from 6.9% on 2GS to 94.3% on 2AtS. A small Spelt-52 signal on 1GL was present in 43.7% of *T. araraticum* genotypes. It was missing in Transcaucasia and Turkey, occurred rarely in southern and central Iraq, but was rather frequent is Iran, northern and eastern Iraq, and in the ARA-1 group (the frequency was twice higher in ARA-1 than in ARA-0). A large Spelt-52 site on 6GL was detected in 86% of *T. araraticum* genotypes, including all ARA-0 and eight ARA-1. It was absent from 12 ARA-1 genotypes (47.6%) andall *T. timopheevii*. Thus, absence of the Spelt-52 site on 6GL was specific for *T. timopheevii.* Some of the ARA-1 genotypes, instead of a 6GL site acquired a new Spelt-52 site on 2GS (Supplementary Figure S23), and in two ARA-1 genotypes the emergence of this locus was accompanied with a significant decrease of the Spelt-52 signal on 6GL. Thus, a new Spelt-52 site probably emerged due to reciprocal translocation between chromosomes 6GL and 2GS.