uninfected control. The resistant line had low virus titers, which were equivalent to or slightly less than that obtained with TC14, the resistant check entry.

Summary of results. 1. The average OD was much lower in *Agrotricum* (OK 7211542) than in the susceptible and resistant wheat cultivars used in backcrosses. The values for *Agrotricum* were significantly lower than those of the resistant check (TC14 line) and those of the two susceptible cultivars, Prinia and Bagula (Table 3).

Table 3. Comparison of virus titers in ELISA after inoculation with BYDV-PAV in test wheat germ plasms.

Germ plasm	Average OD
TC14/2*Spear	0.243 ± 0.108
OK7211542	0.113 ± 0.095
Bagula	0.834 ± 0.309
Prinia	0.766 ± 0.301

2. In the backcross derivatives, the low virus titers were conserved. Titers were not significantly different from each other in *Agrotricum* and its backcrosses to Prinia and Bagula but were different compared to those of Prinia and Bagula. The trend is elucidated in Fig. 1.

3. Analysis of advanced-backcross, selfed derivatives has identified one 44-chromosome line possessing low virus titers. All plants of this line are being characterizedcytologically, and seed is being increased. They will be tested further and subjected to cytogenetic manipulation to effect the resistance transfer in order to recover a euploid wheat with 2n = 6x = 42 chromosomes.

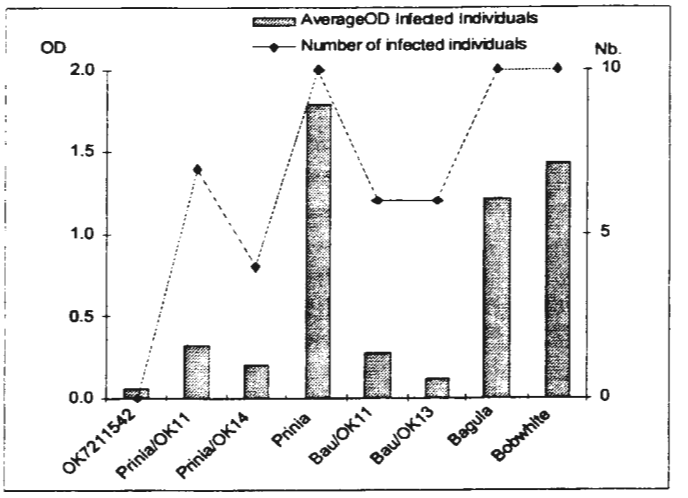

Fig. 1. Virus titers obtained in ELISA for OK7211542 and the BC_1F_1 lines from its backcross to the susceptible wheat Bagula and Prinia. Bau = Bagula, Bow = Bobwhite, OK11 and OK14 = OK7211542 plant numbers 11 and 14 where each had 2n = 8x = 56 chromosomes.

Thinopyrum bessarabicum (2n = 23x = 14, JJ) disomic chromosome addition lines in bread wheat: current germ plasm status.

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Thinopyrum bessarabicum is a self-fertile, maritime grass possessing salinity tolerance and resistance to wheat scab. These important abiotic and biotic characteristics make *Th. bessarabicum* an important Triticeae species to exploit for wheat improvement. We have been producing addition lines of the species in bread wheat. The addition lines were made in a mixed-wheat background (Chinese Spring/*Th. bessarabicum*//Genaro). For the homoeologous group 3, a homozygous 3JL, disomic addition line also was extracted.

The above disomic addition lines having *Th. bessarabicum* (J or Eb) chromosomes in a *T. aestivum* background (2n = 44; 21 II ABD + 1 II J) were analyzed using both AFLPs and RAPDs. Among the J-specific, AFLP fragments amplified from 32 selective amplification primer pairs, 195 fragments were single-chromosome specific. These included 44 AFLP markers for 1J, 46 for 2J, 39 for 4J, 37 for 5J, and 29 for 7J. Although no AFLP markers were specific for 3JL alone, we identified two RAPD markers specific to this chromosome arm. In addition, there were two RAPD markers for 1J, two for 2J, six for 4J, one for 5J, and two for 7J. Fifty-nine AFLP and two RAPD J-specific markers were present in the amphiploid but absent in all tested CIMMYT disomic addition lines making them potential putative markers for 6J or 3JS. The 50 AFLP markers and four RAPD markers were present in all (or at least five) J chromosomes. CIMMYT-derived 2J and 5J addition lines are distinguishable from those originating from the U.K. by 22 and 27 genotype-specific AFLP markers, respectively. All these molecular markers, whether genotype-, chromosome- or genome-specific, are useful in monitoring the introgression of J-chromosomal segments into wheat chromosomes.

Field testing of these addition lines for scab in particular posed a constraint associated with lateness of the germ plasm and also was a constraint for the salinity tests. Some instability of the lines also was encountered. Hence, an elite

bread wheat cultivar Prinia was selected, and by the use of a backcross protocol, the addition chromosomes were transferred to Prinia. Four backcrosses to Prinia were made, and, after the final backcross, the 43-chromosome plants of each addition group were crossed with maize, yielding 21- and 22-chromosome haploids. Mitotic counts associated with C-banding identified 22-chromosome haploids of each group that then were treated with colchicine to yield 44-chromosome derivatives. Currently, homozygous disomic additions have been obtained for 1J, 2J, 3J, 4J, 5J, and 7J. These addition lines are now in a spring wheat, which has early maturity compared to Chinese Spring and Genaro, and will enable us to screen appropriately for the various stresses.

To complete this set, the 6J chromosome and the 3JL translocation chromosome still need to be added. Initial screening used the BC_3-selfed, 44-chromosome progeny for evaluating scab infection in Toluca, Mexico. All lines except of 2J have adequate duration for days-to-flowering and physiological maturity. Type-II level of resistance to scab was present in additions 5J and 7J. Addition 2J was late and was not inoculated. With the one backcross advance now made, and with the doubled haploid base produced, the testing is anticipated to provide greater precision. A similar case would prevail for salinity testing of these lines under field conditions in some Asian locations where late lines are affected severely by heat during grain fill. The level of maturity of the cultivar Prinia is a suitable background to alleviate this constraint. So far, our observations support the trend of doubled haploid derivatives in wheat that is early maturing. This observation needs to be verified for the disomic additions. We do expect the allelic homozygosity to contribute to the stability of the addition lines during their maintenance.

A BC_1 self-fertile intergeneric combination and the spontaneous production of alien multiple disomic chromosome additions.

A. Mujeeb-Kazi, A. Cortés, V. Rosas, and R. Delgado.

Fertile, BC_1 intergeneric combinations by 'bread wheat/tetraploid alien Triticeae species//bread wheat' with $2n = 8x = 56$ chromosomes are valuable alternatives for those F_1 hybrids that generally do not yield fertile amphiploid progeny with ease. In contrast, producing BC_1s on self-fertile hybrids is a very rapid procedure to exploit the hybrid for practical breeding advance until such time that the amphiploid is produced. In the course of this procedure of F_1 advance to BC_1 for a 'Chinese Spring/*Th. bessarabicum*' combination, the progeny possessed $2n = 7x = 49$, AABBDDJ chromosomes that were meiotically associated as 21 bivalents and 7 univalents. Further advance of this BC_1 material was by additional backcrossing in order to produce *Th. bessarabicum* addition lines. Simultaneously selfed seed also was harvested and kept in storage. Surprisingly, the BC_1 49-chromosome plants were observed to be highly self-fertile, and more interesting, the BC_1-selfed plants maintained a chromosome number that had a high frequency of derivatives with 49 chromosomes. The range in chromosome number was from 46 to 52. Where the alien species is a diploid, self-fertile BC_1 progeny are rare, and retention of the alien haploid complement is more rare. This phenomenon was reported by us (Mujeeb-Kazi and Asiedu 1990) without extensive meiotic data.

More recently, Sharma (1996) published cytogenetic findings on a similar combination. In essence, a similar backcross, self-fertility trend was observed. The author concluded that the occurrence of plants with 49 chromosomes for several generations of selfing indicated that the seven chromosomes of *Th. bessarabicum* had a selective advantage and most likely were transmitted only through the female gametes.

With our recent priority being scab resistance, we identified a 'Chinese Spring/*Th. bessarabicum*' amphiploid to have type II resistance to scab. We also checked the BC_1-selfed material that we had stored from our earlier addition line development stage in the early 1990s and found the derivatives to vary in resistance expression. A dosage effect dilution was anticipated, but a complete loss of resistance in individual plants is rather difficult to explain.

Because one spike of each plant had been collected for meiotic analysis, this check was initiated, and the data obtained revealed a totally different trend then that previously reported (Sharma 1996). Plants with 49 chromosomes rarely expressed the 21 II + 7 I associations; instead 22 II to 24 II + 5 I were frequent. In the occasional self-fertile, BC_1 50-chromosome derivatives, we encountered some plants with perfect bivalent meiosis of 25-chromosome pairs.

Additional reserve seed was germinated, and precise cytological analyses involving a mitotic somatic count, FISH diagnostics, and meiotic analysis were made. Plants with 50 chromosomes with 25 II had four pairs of *Th. bessarabicum* chromosomes. These pairs were for chromosomes 2J, 3J, 5J, and 6J.