After the BC_5, F_4:F_8 NILs with *HgRg* and *rghg* genotypes were selected. Experimental material was grown and evaluated at three locations under both favorable and stressed conditions. Favorable conditions included fertilizing and two supplementary irrigations to simulate a 400-mm overall rainfall. Stressed conditions for low rainfall were 200–300 mm of water. Analysis of the 'G x E' interaction was based on Tai (1971). Drought resistance was estimated by calculating a drought-susceptibility index for yield according to Fisher and Maurer (1978). An analysis of variance was made for each test. Of all sources of variation, the genotype, environment, and 'G x E' mean squares were highly significant (P = 0.01) for all traits of productivity. We found that the NILs with the *HgRg* (hairiness and red glume) genotype had an advantage over the *hgrg* (hairless and white glume) genotype for most of the productivity traits. The dominant alleles *Hg* and *Rg* are superior in all environments, which indicates a high adaptation compared to the recessive alleles *hg* and *rg*.

The analysis of field-test data for drought susceptibility index showed an advantage of the dominant over recessive alleles, especially under conditions of severe drought. This study identified eight NILs that were passed on to our National Gene Bank as a donors with high adaptability. A number of promising lines of wheat for further breeding on drought resistance also were included.

References.

Fisher RA and Maurer R. 1978. Drought resistance in spring wheat cultivars. I. Grain yield responses. Aust Res **29**:897-903.

Tai GC. 1971. Genotypic stability analysis and its application to potato regional trials. Crop Sci **11**:184-190.

ITEMS FROM MEXICO

INTERNATIONAL MAIZE AND WHEAT IMPROVEMENT CENTER — CIMMYT
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Perennial intergeneric F_1 hybrids of durum wheat cultivars with alien Triticeae species: germ plasm status and use in breeding.

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Intergeneric hybrids involving durum wheat cultivars and the annual/perennial Triticeae species have been produced to a great extent during the last two decades. Cross combination success was variable, but, in general, protocols involving bud-pollinations, pre and postpollination hormonal treatments, variations in embryo rescue media, and special handling of embryos after plating, together with seedling transplant care have provided adequate diversity to be assembled for durum breeders to address stress constraints encountered in the global cultivation of the crop. Some significant stresses for durums are *F. graminearum*, *H. sativum*, and BYDV, as well as the abiotic stress, salinity.

We list in Table 1 the combinations that were produced by us and are maintained as a living collection at CIMMYT, in El-Batan, Mexico. These F_1s are of a perennial habit and are maintained in pots under screenhouse conditions. Each combination is physically cloned twice a year to maintain three potted plants. Of these, one is colchicine treated until a fertile amphiploid is obtained. The plants are cytologically analyzed after each cloning in order to ensure cytological stability during maintenance.

The self-sterile F_1s in addition are cloned, vernalized, and transplanted for biotic stress screening in Mexico for *H. sativum* and *S. tritici*. Amphiploids, when obtained, are similarly vernalized, and the progeny screened for the above stresses as well as for head scab. Field, border-row, rust inoculations permit us to observe the performance of the germ plasm for leaf, stem, and stripe rusts in three locations in Mexico (El Batan, Toluca, and Poza Rica).

In those cases where we have not yet obtained amphiploids, the self-sterile F_1 hybrids have been backcrossed to elite durum cultivars leading to BC_1 seed. This seed can be tested directly for the stresses and serve for advancing the

Table 1. Details of some annual/perennial Triticeae species hybrids and genetic stocks with durum wheat cultivars (Ad = amphiploid and BC_1 = backcross 1).

Identification number	Pedigree	Somatic chromosome number	Advance status
Annual Triticeae			
96-2704	Laru/*Ae. variabilis*	2n = 8x = 56	Ad
96-2708	Arlin/*Ae. variabilis*	2n = 8x = 56	Ad
96-2805	Altar/*Ae. variabilis*	2n = 8x = 56	Ad
96-2821	Bia/*Ae. variabilis*	2n = 8x = 56	Ad
96-1640	Ceta/*Ae. ventricosa*	2n = 8x = 56	Ad
97-2619	Capelli/*Ae. ovata*	2n = 8x = 56	Ad
96-1250	Capelli/*Ae. triuncialis*	2n = 8x = 56	Ad
96-1254	Capelli/*Ae. speltoides*	2n = 6x = 42	Ad
Perennial Triticeae			
96-1	*E. fibrosus*/Cocorit 71	2n = 4x = 28	Ad
96-2	*E. virginicus*/Cocorit 71	2n = 4x = 28	Ad
96-7	Altar 84/*Th. scirpeum*	2n = 4x = 28	Ad
96-65	Capelli/*Th. acutum*	2n = 5x = 35	Ad
96-66 to 69	Yavaros/*Th. acutum*	2n = 5x = 35	Ad
96-70	Cocorit 71/*Th. acutum*	2n = 5x = 35	Ad
96-72	Cocorit 71/*Th. campestre*	2n = 6x = 42	Ad
96-73	Yavaros 79/*Th. intermedium*	2n = 5x = 35	Ad
96-74	Cocorit 71/*Th. intermedium*	2n = 5x = 35	Ad
96-75	Mexicali 75/*Th. intermedium*	2n = 5x = 35	Ad
96-76	Capelli/*Th. intermedium*	2n = 5x = 35	Ad
96-77	Cocorit 71/*Th. junceiforme*	2n = 4x = 28	Ad
96-78	Cocorit 71/*Th. pulcherrimum*	2n = 5x = 35	Ad
96-79	Mexicali 75/*Th. pulcherrimum*	2n = 5x = 35	Ad
96-80	Mexicali 75/*Th. podperae*	2n = 5x = 35	Ad
96-81	Mexicali 75/*Th. trichophorum*	2n = 5x = 35	Ad
96-82	Mexicali 75/*Th. varnense*	2n = 5x = 35	Ad
96-84	Yavaros 79/*Th. varnense*	2n = 5x = 35	Ad
96-85	Capelli/*Th. varnense*	2n = 5x = 35	Ad
96-86	Cocorit 71/*Th. junceum*	2n = 4x = 28	Ad
96-106 to 108	Arlin/*Th. glaucum*	2n = 5x = 35	Ad
96-109 to 113	Croc 1/*Th. glaucum*	2n = 5x = 35	Ad
96-114 to 115	Yavaros 79/*Th. glaucum*	2n = 5x = 35	Ad
96-116 to 117	Dverd 2/*Th. glaucum*	2n = 5x = 35	Ad
96-134 to 135	Arlin/*Th. acutum*	2n = 5x = 35	Ad
96-136	Altar 84//*Th. acutum*/*Th. intermedium*	2n = 5x = 35	Ad
96-137 to 139	Croc 1//*Th. acutum*/*Th. intermedium*	2n = 5x = 35	Ad
96-140 to 142	Laru//*Th. acutum*/*Th. intermedium*	2n = 5x = 35	Ad
96-143	Arlin//*Th. acutum*/*Th. intermedium*	2n = 5x = 35	Ad
96-144 to 146	Arlin 1/*Th. junceiforme*	2n = 4x = 28	Ad
96-147	Altar 84/*Th. junceiforme*	2n = 4x = 28	Ad
96-148 to 149	Croc 1/*Th. junceiforme*	2n = 4x = 28	Ad
96-150	Altar 84/*El. pungens*	2n = 5x = 35	Ad
96-151	Yavaros 79/*Th. scirpeum*	2n = 4x = 28	Ad
96-152	Laru/*P. spicatum*	2n = 5x = 35	Ad
96-153 to 155	Dverd/ *Th. trichophorum*	2n = 5x = 35	Ad
96-156	Croc 1/*Th. trichophorum*	2n = 5x = 35	Ad
96-157	Rok/Kml//*Th. trichophorum*	2n = 5x = 35	Ad
96-158 to 161	Laru/*Th. trichophorum*	2n = 5x = 35	Ad
96-163	Altar 84/*Th. varnense*	2n = 5x = 35	Ad
96-164 to 165	Altar 84//*Th. acutum*/*Th. intermedium*	2n = 5x = 35	Ad
96-166	Laru/*Th. varnense*	2n = 5x = 35	Ad
96-169	Dverd 2/*Ps. juncea*	2n = 4x = 28	Ad + BC_1
96-170	Yavaros 79/*Th. elongatum*	2n = 3x = 21	BC_1
96-171	Croc 1/*Th. scirpeum*	2n = 4x = 28	BC_1
96-173	Yav 3/Scot//Jo69/Cra/3/Yav 79/4/*Th. elongatum*	2n = 3x = 21	BC_1
96-174	Altar 84/*Th. intermedium*	2n = 5x = 35	BC_1

desired combination for applied purposes via addition/substitution lines and then introgressing the required trait by cytogenetic manipulation. The use of the *ph* genetic stock of Capelli is in its infancy in our program and is projected as a fast source to enforce alien transfers when it is the backcross parent for the F_1 hybrid, yielding *Phph* heterozygote progeny. Selecting the *ph* recessive and achieving the alien transfer are anticipated and being studied.

Of the annual Triticeae species, those hybridized with durum cultivars are *Ae. peregrina*, *Ae. ventricosa*, *Ae. geniculata*, *Ae. triuncialis*, and *Ae. speltoides*. Amphiploids were produced from all the above hybrid combinations (see Table 1).

Intergeneric F_1 hybrids of some bread wheat cultivars with annual and perennial Triticeae species: germ plasm status and utilization in wheat breeding.

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In a bread wheat-based, intergeneric, hybridization program with a focus on applied agricultural objectives, outputs are necessary that address several biotic and abiotic stresses. This is indeed a tall order, because the initial hybrid production in itself is so complex but a necessary starting point. Next in order come the crucial steps of transfering the desirable stress genes and dealing with the genetic distance between wheat and the species involved. We have been involved in F_1-hybrid production of wheat with annual and perennial Triticeae for over two decades. The annual species/wheat cultivar hybrids were relatively easy to produce, and their amphiploid products also obtained easily (Table 2). The complexity resided in the combinations of wheat with species that were not in the primary gene pool,