

individually crossed to 'Zane'. Twenty F_2 derived lines from each cross were evaluated in short, single row plots in the F_2 generation. The top 4 lines per cross were selected for further testing in bordered plots. Although there were significant differences for yield among the regions ($P=5\%$) in the short row test of random lines, no significant difference was found among the regions after the 20% selection pressure was applied. There was, however, some indication that the regions varied in their ability to increase genetic variability. Bulk populations containing 50% PI germplasm were formed for each region by crossing 24 PI's per region to L74-01, a male sterile isolate of 'Williams'. The bulk populations were evaluated for yield in the F_2 generation. No significant difference ($P=5\%$) for yield was found among the origins.

A re-examination of the genomic relationship between sorghum and Johnsongrass. Hoang-TANG and G. H. LIANG. Dept. of Agronomy, Kansas State Univ., Manhattan, KS 66506.

We tested the validity of four major genomic models, that have been proposed for cultivated sorghum (*Sorghum bicolor* (L.) Moench, race bicolor, DeWet), ($2n=20$), and Johnsongrass (*S. halepense* (L.) Pers.), ($2n=40$), by studying chromosome behaviors in the parental species, 30-chromosome hybrids [(sorghum ($2n=20$)xJohnsongrass ($2n=40$))], 40-chromosome hybrids [(sorghum ($2n=40$)xJohnsongrass ($2n=40$))], and 60-chromosome amphiploids. Chromosome pairings in amphiploids are reported for the first time. Data from chromosome pairings in all of these materials suggest that cultivated sorghum is a tetraploid species with the genomic formula AAB_1B_1 , and Johnsongrass is a segmental auto-allo-octoploid, $AAAA B_1B_1B_2B_2$. This model is a modification of Hadley's model. Our model is further substantiated by chromosome pairing in amphiploid plants whose genomic formula is $AAAAA B_1B_1B_1B_1 B_2B_2$.

Evaluation of Trisomic Red Clover. N. L. Taylor, University of Kentucky.

Research was conducted to evaluate the agronomic performance of varying ploidy levels of red clover (*Trifolium pratense* L.). Clones evaluated under field conditions during one season of growth included 8 diploids ($2n=14$), 4 triploids ($2n=3x=21$ or 22), 23 simple trisomics ($2n=15$), 3 double trisomics ($2n=16$), 2 tetraploids ($2n=4x=28$) and 1 pentaploid ($2n=5x=35$). The pentaploid and diploid clover were the most vigorous and persistent. Particularly low in persistence were the double trisomics, and the triploids. Seed yields were lowest in the pentaploid, and the triploids. The simple trisomics did not differ in seed yield from the diploids but were lower than the double trisomics and tetraploids. Trisomics were summarized by trisomic number (1-7), including all trisomics of the red clover genome. Only Trisome 1 (satellited chromosome) was not different from the diploids in most characteristics. All other trisomes (2 to 7) were less vigorous, less persistent and lower seed yielding than the diploids. No morphological characteristic could be associated with trisomic number. All trisomics were sufficiently vigorous to allow genetic investigations under field conditions.

The Role of Some Cytogenetic Systems in effecting Alien Genetic Transfers for Triticum aestivum Improvement. N. TER KUILE, V. ROSAS, R. ASTEDU and MUJEEB-KAZI*. CIMMYT, Lisboa 27, Mexico.

Practical alien transfers in *Triticum aestivum* have predominantly been for simply inherited traits. The transfer methodology is variable and may include: (i) use of the 5B mechanism for enhancing F_1 recombination events as demonstrated by *Triticum aestivum*/*Aegilops variabilis*; (ii) development of complete or partial synthetic genomes in effecting modified alien transfers with potential of direct practical utilization involving wheat/alien amphiploids or wheat/alien backcross selfed derivatives; (iii) induced translocations for incorporation of alien variability via wheat pentaploids developed as *T. aestivum*/Alien sp.//*T. turgidum*/3/*T. aestivum* or *T. aestivum*/Alien sp.// n^{**} /*T. aestivum* (alien addition)/3/*T. turgidum*, and (iv) tissue culture of *T. aestivum*/*Aegilops variabilis* F_1 hybrids as a means of introducing alien variability following long term callusing and regeneration.

Efficacy of Random Interbreeding to Develop Soybean Populations with Highly Productive Segregants. D. J. THIBEAU*, J. O. YOCUM, and P. B. CREGAN. USDA-ARS, Beltsville, MD and Penn. State Univ.

Our objective was to compare the productivity of segregants derived without interbreeding with those derived from three levels of random interbreeding. Nineteen S_1 -derived lines were tested per interbreeding level (IL) from each of three single crosses in replicated tests in five environments. In one cross a significant decline in the mean yield over environments was observed between IL_0 (no interbreeding) and IL_3 . In the remaining two crosses the mean yields over environments were similar at each of the four levels. In order to determine if unusual high yielding segregants might be forthcoming from the S_1 -derived lines, two S_2 -derived lines were selected from the nine highest yielding entries of each single cross x interbreeding level combination and were grown in replicated tests in three environments. In the three crosses the yield of a total of 6 IL_0 , 2 IL_1 , 1 IL_2 , and 1 IL_3 lines significantly exceeded the mean of three high yielding check genotypes. Our data do not indicate that random interbreeding is beneficial to the generation of unusual highly productive segregants and suggest that interbreeding may be detrimental in this regard.

A Test for Winterhardiness in Winter Wheat. J.B. THOMAS*, G.B. SCHAALJE and D.W.A. ROBERTS, Ag. Canada Research Station, Lethbridge, Alberta.

Cold resistance is an important trait in winter wheats, bred for cold climates. For common wheat (*Triticum aestivum* L. em. Thell.) varieties, germinated and hardened in the dark at +0.75 °C, the duration of survival at -10 °C was closely related ($r=0.9$) to relative winter survival ability in the field. This test is completed in the dark so the use of growth facilities is minimal and procedures are simple to suit the needs of routine testing. The test will identify selections worth testing under field conditions. Mass selection should also be possible, provided the population under selection has segregated widely for winter survival ability.

Chlorophyll Fluorometry and Infrared Thermometry as Selection Tools for Drought Tolerance in Maize. Jim Thomas* and C. E. Wassom, Dept. of Agronomy, Kansas State Univ., Manhattan, KS 66506.

This study was undertaken to study the use of chlorophyll fluorescence and canopy leaf temperatures as a means of quantifying stress tolerance among cultivars. Fluorescence (F_v) and temperature (T_d) responses were $F_v = (F_p - F_0)$ and $T_d = (T_{canopy} - T_{air})$, respectively. Responses of 25 S_1 lines, their S_2 progeny and some of their hybrids were evaluated. T_d and F_v were negatively and positively correlated with grain yields, respectively. Generally, yields were higher as F_v increased and T_d decreased. Heritability estimates using parent-offspring and mid-parent offspring regressions were obtained. T_d heritability estimates depended on location while F_v estimates were significant and more stable across locations.

Selection in Soybean for Discrete Levels of Seedcoat Permeability C. N. TINNIUS* and KUELL HINSON, North Carolina State Univ. and Univ. of Florida, USDA-ARS.

The impermeable seedcoat trait has been suggested as a means of improving soybean (*Glycine max* (L.) Merr.) seed quality in the field and in storage. Research was initiated in F_4 rows to select for a range of seedcoat permeability and to stabilize discrete levels in isogenic breeding lines. Single plants from two crosses were tested by soaking seeds in water and recording the number impermeable after 1, 3, 7, and 27 h. From a given plant row, two single plants with the widest range of permeability at 1 h were selected for planting the following year. Successful selection for different levels of permeability within rows was associated with an intermediate level (30-70%) of permeability of the parent plant and a wide range in percentage of impermeable seeds from the plants selected. Seed size was poorly correlated with permeability. Mean percentage of impermeable seeds was associated with mean high temperature during the months of seed formation and maturation. A wide range of seedcoat permeability was maintained through the F_6 generation, and the isolines developed will provide materials to test the trait for its effects on seed quality.