Analysis of diallel cross of some quantitative characters in common wheat (triticum aestivum, l.)

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the aim of this investigation was to determine the heterosis and types ofgene action and their interaction with seasons (environments) for some growthand yield characteristics, i.e. heading date, physiological mature date, plant height, height up to flag leaf, height of flag region, number of tillers per plant, number of, spikes per plant, flag leaf area, spike length, number of spike lets per spike, number of grains per spike, 1000- kerenl weight, grain yield per plant, straw yield per plant. harvest index% and total plant weight. to achieve this taraget fi and f2 of half diallel cross between nine parental varieties and or! lines namely pi (gemrnieze i), p2 (rcb33), p3 (rcb56), p4 (sakha69), p5 (rcb70), p6 (rcbi22), p7 (rcb143), p8(gizai57) and p9 (gizai46)(representing wide range of variability in most of the studied traits were utilized in 1991i92 season, crossing was made with all possible combinations amongthe nine parental and evaluated in successive season 1992/1993 in a randomized complete block design with three replications. in 1993/1994 season, two experiments were nducted, the first involved the parental lines and their thirty six possible crosses and the second included ,parents and f2 crosses data were recorded on 10 and 60 individual guarded plants, chosen at random from each plot for fi and f2,respectively. analysis of variance was performed for the studied traits in each season and then a combined analysis was carried out whenever homogeneity of error variance was realized. heterosis meansquares and effects for both generations were calculated the data were genetically analysis by the procedures by griffing (1956), hayman (1954 a) and jinks (1954).the obtained results can be sununarized as follows : 1 _analysis of variance , mean and heterosis : a - fl generation : 1 _season mean squares were significant for all the studied traits except height up to flag leaf 2 _significant genotype mean squares were detected for all the traits in the separate season as well as the combined analysis. significant genotypes x seasons interaction mean squares were obtained for all the studied traits except heading date and flag leaf area, 3 _mean squares due to parents were significant for all the studied traits, whereas, significant mean squares due to interaction between parental varieties and seasons were detected for all the studied traits except heading date, physiological mature date, height up to flag leaf, height of flag regionand flag leaf area 4- sakha 69 behaved as the earlist one for heading date. the parental line rcb70 was on the top of the tested parental lines in grain yield per plant, significant crosses mean squares were detected for all the studied traits, while, significant mean squares due to interaction between crosses and seasons were obtained for all traits except heading date and flag leaf area, the two crosses (6x9) and (2x6) had the highest grain yield per plant, 6 _mean squares for parent vs. crosses were of appreciable magnitude inboth seasons as well as the combined analysis for all investigated traits except number of spikes per plant in the second season. significant interaction between parents vs. crosses and season was detected for all the studied traits except heading date, plant height, height up to flag leaf : eight offlag region, flag leaf area and 1000 - kernel weight. formaturity date, the cross (lx7) expressed significant negative heteroticeffects relative to better parent. also, the crosses (1x2), (lxs), (2x6) ,(4x6) and (6x9) had the highest heterotic effects relative to better parent for grain yield per plant.f2 – generation 1 - mean squares for genotypes, parents, f2 crosses and parent vs. crosses,were highly significant for all the studied traits. 2 - the

most desirable remain heterosis were presented by three crosses for plant height, nineteen crosses for flag leaf area, four crosses for number of grains per spike, one crosses for grain yield per plant, three crosses for straw yield and one crosses for maturity date combining ability, fl - generation.1- the mean squares associated with general and specific combining ability were significant for all the studied traits. low gcaj sca ratios of less than unity were detected for number of spikes per plant and total plant weight per plant in both seasons as well as the combined analysis, number of tillers per plant, straw yield and harvest index in both seasons, number of grains per spike and spike length in the ftrst season, and grain yield per plant, 1000 - kernel weight and number of spikelets per spike in the second season. while, the magnitude of additive and non additive types of gene action were similar for height of flag leaf maturity date, number of spikelets per spike, 1000 - kernel weight and grain yield per plant in the ftrst season and straw yield per plant in the combined analysis.however, high g.c.a / s.c.a ratios which exceeded the unity were detected for other cases, 2- the interaction between season and general combining ability was significant for all the studied traits except, plant height, height of flag region, spike length, number of grains per spike, 1000 - kernel weight, grain yield per plant, total plant weight and straw yield per plant. however, insignificant mean squares of interaction between s.c.a and season were obtained for heading date, maturity date, flag leaf area, 1000 - kernel weight and harvest index. 3- the parental lines sakha 69, rcb 122, rcb 143, g. 157 and g. 164 for heading date and parental line rcb 122 for 1000 - kernel weight andgrain yield per plant, number of grains per spike and total plant weight per/plant gave the desirable (g.) effects. 4- the combinations lx8 and 6x9 for maturity date, 6x9, lx8, lx3, 2x6, 2x5 and 8x9 for grain yield per plant and 2x4, 2x5, 4x6 and 8x9 for total plant weight and straw yield had the desirable (s ;;) effects for these traits, f2 - generatioll1 _general and specific combining ability mean squares were highly, significant for all traits g.ca / s.ca ratios were higher in magnitude in f2 than fl generation for most traits. 2 -the parental line rcb 122 expressed signnificant desirable (g.) effects, for flag leaf area, 1000 - kernel weight, harvest index and grain yield per, plant. while, parental line rcb 143 had significant desirable (g.) effects, for plant height, height up to flag leaf heading date, maturity date, number oftillers per plant, flag leaf area and straw yield. also, the, parental variety g. 157 gave significant desirable (s.) effects for plant, height, height up to flag leaf, height flag region, heading date, 1000 kernel weight, total plant weight, straw yield and grain yield, genetic components, fl – generation, 1- significant values for the dominance and additive components (h 1) and, (d) were obtained for all traits except maturity date, and 1000 – kernel, weight in the first season and number of spikes per plant in the second ”1, season which insignificant (d) component was obtained. significant (b.) values were detected for all traits except number of spikes per plant in the second season, 2- studies on degree of dominance revealed the existence of overdominance, for all traits except plant height in both seasons and height up to flag leaf in the first season. the negative and positive alleles were unequally, distributed in the parents for heading date, plant height, number of tillers, per plant, number of grains per spike, total plant weight, and harvest, index in both seasons, number of spikes per plant, spike length,number of, spikelets per spike and grain yield per plant in the first season, and, maturity date and 1000 - kernel weight in the second season, 3- low heritability values in narrow sense were detected for all traits except, plant height and heading date in both seasons and height up to flag leaf, in the second season which moderate values were detected, f2 – generation, 1 _the additive component (d) reached the significant level in most cases, while, significant values for dominance component (hi) were obtained, for all traits 2- the average degree of dominance, showed the presence of over, dominance for all traits except plant height, height up to flag leaf and number of grains per spike wgich had a complete dominance, the negative and positive alleles were unequally distributed in the parents for 1!6, plant height, heading date, maturity date, number of tillers per plant, peduncle leaf, spike length, number of spikelets per spike, number of grains per spike and 1000 - kernel weight, 3- low to medorate heritability values in narrow sense were showed in all the studied traits except heading date and harvest index which high values were detected, graphical anaiysjs : - fl generation1- the parental inbreed lines p8 for heading date, p4 for maturity date, p4 for straw yield seemed to be carry most of dominant genes that responsible for these traits. however, p2 and p3 for heading date, pi and p2 maturity date, p5 for grain yield per plant and p2 for straw yield per plant possessed more recessive genes f2 – generation the parental

lines no. 4 for maturity date plant height; height up to flag leaf and peduncle leaf and p7 for spike length, 1000 - kernel weight and grain yield per plant seemed to be carry most of dominant genes for these traits. however, p8 for maturity date and grain yield per plant and p4 for 1000 - kernel weight and straw yield possessed more recessive genes for previous traits.