Breeding studies of some economic characters in peanut

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SummaryThe aim of this investigaion was to determine the extent of heterosisand gene action estimates for some agronomic characters i.e. floweringdate, maturity date, main stem length, number of branches per plant, numberof pods per plant, pod yield per plant, pod length, pod diameter, 100-podweight, number of seeds per plant, IOO-seedweight, number of seeds perpod, shelling percentage and seed oil content in six peanut lines and theirhybrids.Six parental lines namely; (Giza 4, ICGV 87156, Giza 5,ICGV87159, Local 235 and ICGV 87165), representing wide range of variabilityin most of the studied traits were utilized. Crossing among the parentalmaterial by means of a diallel system was initiated in 1989 growing season.In 1990 season the obtained hybrid seeds from each of 15 crosses was sownto obtain F2 seeds. Meantime, the same work of the previous season wasreported for obtaining more F1 seeds.In 1991 growing season two experiments were conducted at IsmailliaAgricultural Station, the fITStexperiment involved the six parental varietiesand their F 1 crosses and the seconed included parents and F2 crosses wereevaluated. A randomized complete block design with three replications wasused.Data were recorded on 10 and 20 individual guarded plants chosen atrandom for F 1 and F2, respectively. The data obtained for each trait wereanalysed on individual plant mean basis. An ordinary analysis of variancewas firstly performed. Heterosis was computed as mean squares and as thepercentage of F 1 and F2 means performance from the mid-parent and betterparent average values for individual crosses. The data were geneticallyanalysed by the procedures developed bye Griffing 1956) ,(Hayman 1954)and (Jinks 1954).The obtained results can be summarized as follows:1- The genotypes mean squares were significant for all the studied traits,also, parents, hybrids and parents vs. hybrids mean quares were significantfor most traits.2- Four crosses (ICGV 87156 x Giza 5) ,(Giza 5 x loca1235) ,(Giza 5 xICGV 87156) and (ICGV 87159 x ICGV 87165) significanly surpassedthe respective mid-parent, for seed yield per plant. While, later three crossesof the previous crosses had significant positive heterotic effects relative tobetter parent.3- Significant correlation coefficients between mid-parent and F 1 hybridsmean values were detected for maturity date, number of branches per plant,pod length and 100-pod weight. While, insignificant correlation valuesbetween mid-parent and F2 hybrids mean values were detected for all thestudied traits, except maturity date, main stem length, pod length, poddiameter, number of seeds per plant and number of seeds per pod.4- Mean squares with general and specific combining ability weresignificant for all traits except, for flowering date which showedinsignificant SeA-Both additive and nonadditive gene effects were involved”:.,In determining the performance of single cross progeny for all traits except,flowering date where additive gene effect was the more important part ofthe total genetic variability. Also, the results showed that all traits except,number of pods per plant, number of seeds per plant and shelling percentageexhibited high G.C.A.IS.C.A. ratios with exceeded the unity indicating thepredominance of additive gene action in the inheritance of such traits.whereas, the nonadditive gene action was predominance for the exceptionaltraits, The results obtained from F2 generation where confirm that reached forF1 data in most traits. Also, the same conclusion was obtained by eithercomponent or graphical analysis.5- In the F 1 generation, the parental line (Local 235) showed significantpositive gl effect for pod yield per plant, pod length, pod diameter, 100-podweight, seed yield per plant and 100-seed weight. The parental line (ICGV87165) seems to be the best combiner for maturity date,

number of branchesper plant, number of pods per plant and number of seeds per pod. While, theparental line (ICGV 87159) gave the highest positive gl effect for oilpercentage and number of seeds per pod. Significant correlation coefficientvalues between the parental performance and its gl effects were obtained forall the studied traits except, number of pods per plant, pod diameter, numberof seeds per plant, shelling percentage and flowering date.6- In the F 1 generation, the most desirable inter-and intra-allelic interactionswere represented by four crosses for maturity date, three crosses for numberof branches per plant, five crosses for number of pods per plant, four crossesfor pod length, four crosses for 100- pod weight, three crosses for 100- seedweigth, five crosses for seed and pod yields per plant and four crosses for oilpercentage. The most desirable inter-and intra-allelic interactions in the F2were represented by one or more of the previous crosses had significantdesirable S.C.A. effects in the F1 generation.7- Studies on nature and degree of dominance revealed the existence ofoverdominance for most traits.8- The negative and positive alleles were unequally distributed among theparental population for all traits except, number of branches per plant,flowering date, pod and seed yields and number of seeds per pod.9- High heritability values in narrow sense were detected for maturity dateand 100- pod weight. Moderate or low hertability values were obtained forother traits. The same conclusion were obtained by F2-data.10- The correlation coefficient between the parental values (Yr) and parentalorder of dominance Wr + Vr was significant negative values for number ofpods per plant and appreciable negative value for number of seeds per plant,revealing that increaser genes were dominant over decreasers. However,appriciable positive correlation coefficient values were detected for maturitydate, main stem length, number of branches per plant, 100- pod weightnumber of seeds per pod, shelling percentage and oil percentage, indicatingthat decreasing genes were dominant over increasing ones. While, lownegative or positive correlation coefficient values were detected for othertraits.11- The parental genotypes (Giza 4, ICGV 87165, ICGV 87159, Giza 4,ICGV 87165, ICGV 87165 ICGV 87165 ICGV 87165, Local 235, Giza 4,Local 235, Giza 4, Local 235, Giza 4, Local 235) and 5 seemed to carry mostdominant genes responsible for flowering date, maturity date, main stemlength, number of branches per plant, number of pods per plant, pod yield perplant, pod length, pod diameter, 100- pod weight, number of seeds per plant,seed yield per plant, 100-seed weight, number of seeds per pod, shellingpercentage and oil percentage respectively. While, other parental genotypesno. Giza 5, Local 235, Giza 4, Giza 4, Giza 5, Giza 5, Giza 5, Giza 4, Giza 4,Giza 5, Giza 5, ICGV 87159, ICGV 87159, ICGV 87156, ICGV 87165)possesed more recessive genes in the same order.