Genetic and cytological studies on some triticale hybrids

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smlMARYThe present investigation was carried out through five successiTeseasons of 1986, 1987, 1988, 1989 and 1990. The data wereobtained on two back-croasea (BC3) i.e «Giza 157 x Petka) x Giza157) and «Sakha 8 x Petka) x Sakha 8). The recorded data weretaken on the individual plant baais in cas. of agronomic characterswithin each of the four replicates of a given genotype. The proteiDidentified through using electrophoresis. analysis for the subunitsJfGtV gluteDine, w-gliadine, ~1W glutenine, y-gliadine and ~/p gliadin ••The cytological studies were carried out on the meiotic and mitoticc~llsof the individual plants of each genotype •.ccordingly, data will be classified into three parts .81’01-lovs,Jn the f’irat par+,Some of the agronomic characters were evaluated.1n the second par: ,proteina of tbe individual plants of thetwo back-crosses were identified. In the third part,cytological atudieswere carried out on the meiotic and mitotic cella of’ the individualplants for parents, FI’s and both of the two back-crosses.Tbe obtained results could be su••• ri.ed as tollows.1. GeDetic evaluation of cbaracters.S_ of the .00nOllic characters were studied. The.e charactersincluded, plaat height, spike length, peducle len«th, n•••ber of tillers.ste. waxiness, number o~ ke:naels per spike. D•• ber of”spikeletsper ear (spike). IOO-kernel weight per plant, n~ber of kernela perspikelets and grain yield per spike. Means,S.E. and co.~ficient. ofvariatioo were estimated for these characters Cor wheat parentalGiza 157, Sakha 8 and tor rye parent, Petka. MoreoTer, the.e characterswere als. evaluated in the two Fl’a, Giza 157 x P.tka andSakha 8 x P.tka besidecthe tvo back-cross.s plante. The results couldbe su••• ri.ed as ~ollow.:1. For plant height character, the two Fl’. were taller thanthe wheat parents.and most of the back-cro •••• plants weretaller than the wheat parents.2. For spike length character,the two F1’. plante shoved lonpr,spikes than that of the wheat parents which .howed correlationbetween the length of’ spike and the h.ight o~ plant.Some plants of the two F1”. were f’oUlldto carry .ore thaDone spike on the main stem (3 - 14 spikes) which ••.y due tothe pre.ence of rye chromosomes in the genome. or theFtplants.3. For peduncle length character,The plants of’ the tvo FI’-tend to be shorter similar to the wheat parent. and .oat of’the plants of the two back-croas.a ahowed ahorter pedunclelength than that or the rye parent.4. For tillering ability character,Tbe plant. of’ the two FI’eshoved less number of tillerins than that o~ the ¥.beat aDdrye parents. Most of the two back-ero •••• plante reYealedle.s number of tillers than that of’ the parents.It was foundthat, the lower grain yield per plant was highly att.ct.d bythe lower number of tillers..For stem waxiness character,a waxy layer was ~ound in thest•• o~ the two FI’S plants and .ost o~ the two back-crossesplante. This character was found only in rye plants and it••y indicate the presence of rye chromoso-e. in the hybrids.6. For the number of kernels per spike character,it was foundthat lower number of grains per spike in the two FI’s andthe majority of plants of the two back-crosses may resultedfrom the effect of the barriers between the two species.7. For the·number of’ spikelets’per spike character, it wasf’ound that number of spike lets per spike was low in the twoF ’s as eompared to the wheat and rye parents. Most of’pl-Iants of’ the two back-croases showed high number of’ spike-Iota per spilce aa cOlBpared to the wheat parente.B. For the number of’kernels per spikelets,it was shown ·thatthe number of’kernels per spike was lover in the two F1’8aDd most or the two back-croas.s plants than that of thewheat parent •• The low ••ed-setting in the two F1’s and thetwo back-crosses plants reveals a strong reduction of’ rertility1n these plants.9. For IOO-kernel weight per plant character,it was

noticedthat ;~vere reduction in lOO-«raiD weicht per plaut in thetwo FI's and most of' the tvo back-era •••• plante aa ca.paredto the wheat parents.10. For the grain yield per plaat character, lover yield perplant was recorded in the two FI'S plants as well as in thetwo back-crosses plants which may attributed to the greaterinstability of the hybrids containing rye chromosomes ascompared to the wheat parents. The lower erain yield perplant vas highly affected by the lower number of grains perspike ,lower number of «I"&in8 per spike lets and the lowerlOO-kernel weight per plant and lower tillerins ability.2. Protein identification by electropb.oreeis analyeie •The SDS_PAGE analysis bae shown that higher Tariability betweenthe electropboretic bands in the plants of' the tvo back-crosserascompared to the vbeat parente, Giza 157, Sakha 8 aDd rye parent ,Peta,The obtained results could be s~ri8.d as follow:1. S~ plants of the tvo back-crosse. shoved deficiency inthe principle v-gliadin and L~N glutenin subunits whichcontrolled by sene. on the ahort a~ of'CbrGaO.o-e lB. Itia po.sible that the•• plaDts contain wheat - rye chre-o ••••translocation.2. S~ plants of the two back-crosse •• bowed deficiency inso.e bands of the HMW «lutenin as compared to the Vbeatparents which may due to the presence of rye chro.oe~s.3. Tvo back-cross plant. of(Sakba 8 X Petka)x Sakba a,ahovedmore bands in HMW and LMW glutenin subunits .s co-pared tothe wheat parents.4. S••• other plants of the two back-cro ••e shoved di£ferentbands in the HMW glutenin, v-gliadine,LMV slutenin IIIldy_gliadine a. cOIIpared to the wh.at pare.t ••5. The rest o~ the tvo back-cro •••• plante shoved in.iSfti~icaDtdl~f'.rence. ~rOlD the banda of the wh.at parente.6. It vas fOlUld that there i. no ditference. bei;..-n the parentsand the tvo back-croa.es plants in the 01' gliadiDe.3. CytoloC!c~! __~.t.?~i_!!:).a. Cytological beha?iour 01' chromosomes:The cytological behaviour of chromosomes vaa studied at propha.e l(diakinesis stage), •• tapbase 1, anaPha •• 1, anaphase 11 andtetrad for the parenta, F1'. and the two back-cros ••• plants. Theresults of' such study could be summarised •• f'0110w8s1. At diakinesis stage, the PMC's of' the parent. showed thatthe univalent. vere lower than that of the two Fl'a. TheUfti?&lents were not observed in the I")'eparent, Petka.Tbeunivalent a?erap vas d1f'f'ered1n the ex_ined I~C'.81"the tvo back-cro •••• plants,ln •••• pleat.,th. average of'univalents vas 1••• than 1 while in other plants 1t vaamore than 7 univalenta.2. At diakinesis staga, The PMC'. of' the parents shoved rin«and rod h1.valents in a range less than that of' the two Fl's1n the ease of' the rye parent,Petka,Ubival.nts could be 7rine or rod bivalentS. The bivalent. ran«ed tr~ 1••• tbaD2 to More than 8 in the PMC's of' the two back-ero •••• plant•• rho multivalent. were-detected in some plants of' thetwo bac~crOS5es.3. At •• tapba •• 1, the ~lC'. of the parents .boved inaisaiCicaat number of univalent •• Meanwhil. in Ale's of' the t••F l's shov.d high D~r of lagging univale.ta. The IagPoIICunivalent. vere found high in S0-8 plant. &ad low in theothers of the two back-ero •••• (BCJ).4. At anapha •• 1, the FMC'. of the parents .howed inalsnifio_tlagging chro-oao.es. Meanwh~le,th. FMC's of' the two F1'.show.d high percenta«e of lagging chro-osome •• Laggingchromosomes were also ob•• rTed in 80•• plant. of' the tvaback-crosses. The chromatid bridges were detected inanaphase I for the FMC's of' the two Fl'. and so••• of' tbetvo back-crosse. plants.5. , anaphase ll,lagging chromosome. vere detected in theI ~'-C'sof the tvo F l's with bigh p.rcentage •• compared tothe parents. The FMC'. of .om.plants of the b.ck-cro ••••showed high percentage of lagging cbro.o6. At tetrad, micronuclei were found in the irrecular FMC'.of the tva FI'a. Sa.e plant. of the tvo back-eroa ••• shoved.ierenuclei in their FtIC'. with higher perceatase thaR thatof' the FI's plants. S••• other plants shoved normal distributionof the nuclel.7. The hlsh degree of •• iotie irregularities vhic~ -.nitestedin the occurance of umdval.nta, .ultivalents, laggingcbr_omosomes at anaphase 1 and 11, and the higher number of'tetrad's with micronuclei, all suggest the presence or ryechromosomes in the wheat genomes.).b. C-banding:The C- banding karyogram of Petka variety of rye was carriedon. Svery chromosome pair is characterized by a specific bandingpattern. Chromosomes are suggested to be designated by 1R to 7R. Theresults could be summarised as follovss1. Chromosome 2 showed a small band near the centromere positionin the long arm.2. Chromosome 3R showed a band on the sbort arm that is closerto the centromere than in 2R.3. Chromosome 6R characterized by the subterminal centromereposi tiOD showed band in t:he.'lon~,~"" :n~,r ;the centromere.4. Th •.~unband.d chromosom.a.,_ 'T'he mitotic cells of: the 41bli.ck..;·•c•i.r·or("l~c~) plants showedthat 14 plants were found to contain 4) chromosomes. Thenumber of plants Which shoved 43 and 44 chromosomes in theirmitotic cells vas one plant. 8 plants showed differences intheir chromosome number as it ranged fromm35 to 41. 9ne plantshowed 28 chromosomes.6. Some mitotic cells of the two’back-croaaea shoved micronucleibeside the main nucleus. These micronuclei vere found indiff’erent stages of division (interphase ,late prophase).