ENGLISH SUMMARY

rhe present studies were carried out four successive seasons of 1996/1997, 1997/1998, 1998/1999, 1999/2000 and 2000/:;001, respectively. Screening was carried out through the first season for all the studied materials (3 Pc lines; Pc 29, Pc 62 anc Pc 63 and 6 new varieties, Sids 4, Sids 5, Sids 6, Sids 7, and Sids 9), data were recorded on the second season (1997/ 1998) on the 9 parents and the obtained F_1's originated from crossing the three Pc's with each of the Sids's varieties. These Pc lines were selected according their efficiency to utilize from some microelements as they contain some translc cations. The present investigation was undertaken in order .o focus on some selected segregants from F_2 and back-crosse ; populations that may contain one or more of the rye segments in the wheat genomes. In other words, to select substitution or/and additional segregants of wheat for the aim of combining the quality of wheat with the efficiency to utilize the m croelements. Some Pc chromosomes were characterized by car ying genes responsible for Fe, Zn, Cu and Mn efficiency (on the 5R), (4R), aluminium tolerance (on the 4R). Thes studie were classified into three main categories as follow ing:-

1. Mcrphological studies on the main economic characters of these lines and some selected segregants from F_2 back-c rosses populations that may contain one or more of the ry(segments in the wheat genomes.

2. Cyl ological studies on the chromosomal number in mitosi ;.

3. Eff ciency of micronutritional genes in translocated wheat lines.

1. Mcrphological studies on the main agronomic traits of these lines and some selected segregants from F_2 and back-crosses populations that may contain one or more of the rye segments in the wheat genomes:-

Dbserved means and standard errors were estimated for the stL died characters for wheat parents, Sids 4, Sids 5, Sids 6, Sids 7, Sids 8 and Sids 9 and for Pc parents; Pc 29, Pc 62 and Pc 63. Moreover, these characters were evaluated in the studied lines in the first season. The evaluated characters were plant height flowering date, maturity date, spike length, number of grains per spike, number of spikelets per spike, 1000-kernel weigh and grain yield of spike.

L Pla heioht:-

Parents:

The observed means of plant height in parents; Sids 4, Skis 5, Sids 6, Sids 7, Sids 8 and Sids 9 (hexaploid wheat) were 05.00, 105.00, 112.50, 97.50, 107.50 and 93.75 which showed great variability between parents as Sides 4, Sides 5, Sides 5 and Sides 8 revealed higher length while Sides 7 and Sides) revealed shorter length. Meanwhile, the lines; Pc 29, Pc 62 and Pc 63 were found to be more longer than the Sides parent; (132.50, 136.25 and 135.00 cm, respectively). The standard deviations of parents also showed highly significant differt aces (2.34, 1.78, 3.90, 1.00, 4.16 and 3.36 for Sids's parent; while 0.17, 2.56 and 1.78 For ?c's parents).

The f lant height of the selected plants from F_2 and BC popul ttions:

Concerning the selected plants from the segregated gener2 tions, there is a tendency in plant height character toward the Pc lines more than the Egyptian wheat lines (Sids parents).

2. Flowering stateL

Par snts:

The o)served means of days to flowering in parents; Sids 4, Sids 5 Sids 6, Sids 7, Sids 8 and Sids 9 (hexaploid wheat) were 77.00, 84.00, 85.00, 86.00, 87.00 and 86.00 which showed great variab lity between parents as Sides 4 and other Sids's parents which revealed shorter days to flowering (anthesis) while Sides 5, Sides 6, Sides 7, Sides 8 and Sides 9 revealed longer days to flowering. Meanwhile, the lines; Pc 29, Pc 62 and Pc 63 were found to be more longer days to flowering than the Sides parent; (120.00, 120.75 and 119.25, respectively). The standard deviations of parents also showed highly significant differences (2.06, 3.12, 1.90, 4.92, 3.15 and 2.78 for Sids's parent; while 3.67, 4.11 and 1.66 for Pc's parents).

The f owering date of the selected plants from F2 and BC **populations:**

Concerning the flowering date of the seleed plants from the segregated populations, the date to flowering tend to be ea .ly like the Egyptian wheat lines (Sids parents) and somet: rnes early than these lines.

3. vlaturitv date:-

The observed means of days to maturity in parents; Sids 4, Sid ; 5, Sids 6, Sids 7, Sids 8 and Sids 9 (hexaploid wheat) were 51.50, 153.75, 155.00, 156.50, 157.00 and 1 58.00 which showed great variability between parents as Sides 4 and other Sids's parents which revealed shorter days to maturity while

Sides 5, Sides 6, Sides 7, Sides 8 and Sides 9 revealed longer days t. maturity. Meanwhile, the lines; Pc 29, Pc 62 and Pc 63 were found to be more longer days to maturity than the Egyptian Sides parents (158.25, 159.00 and 159.00, respectively). The standard deviations of parents also showed highly significant differences (2.10, 0.76, 3.55, 1.09, 1.60 and 2.34 for Sids's parents while 2.45, 1.85 and 1.05 for Pc's parent ;).

The maturity date of the selected plants from F_2 and BC popul itions:

Concerning the maturity date of the selected plants from the segregated populations, the date to maturity tend to be early like the Egyptian wheat lines (Sids parents) and sometimes early t Ian these lines.

4. Spike length:-

the observed means for parents were 16.800, 17.050, 17.15(, 16.700, 14.950 and 16.225 for wheat parents (Sids 4, Sids 5, Sids 6, Sids 7, Sids 8 and Sids 9) while 14.850, 9.350 and 1 .800 for Pc's parents (Pc 29, Pc 62 and Pc 63) showed highly significant differences between parents. The standard errors of parents also revealed highly significant differences (0.07, 0.78, 0.18, 0.34, 0.59 and 0.12 for Sids's parents while 0.30, (x.34 and 0.57 for Pc's parents).

The spike length of the selected plants from F_2 and BC popul. itions:

Concerning the spike length of the selected plants from i he segregated generations, there are great variability in spike ength with a tendency toward Egyptian wheat lines (Sids parent i).

5. Nur fi ber of spikelets per spike:-

Table (2) showed the spikelets number per spike in parent; as 24.350, 25.150, 23.350, 24.500, 22.175 and 24.250 for he caploid wheat (Sids 4, Sids 5, Sids 6, Sids 7, Sids 8 and Sids S, respectively) and 26.550, 20.950 and 23.400 for Pc's lines Pc 29, Pc 62 and Pc 63, respectively) indicating the signifizant differences between parents in such character. The standard deviations of parents also revealed highly significant differences (0.06, 0.74, 0.50, 0.13, 0.34 and 0.51 for Sids's parent 3 while 0.60, 0.74 and 0.92 for Pc's parents).

The r umber of spikelets per spike of the selected plants from 1 2 and BC populations:

n case of number of spikelets per spike of the selected plants from the segregated generations, the number of spikelets per sp ke ranged from 11 to 42 with a great variability.

6 ht

was showed the grain weight per spike in parents as 4.333, 4.818, 5.105, 4.965, 4.155 and 4.920 for hexaploid wheat (Sids 4, Sids 5, Sids 6, Sids 7, Sids 8 and Sids 9, respectively) and 1.773, 2.000 and 2.430 for Pc's lines (Pc 29, Pc 62 and Pc 63, respectively) indicating the significant differe nces between parents in such character. The standard deviat ons of parents also revealed highly significant differences (0.04, 0.01, 0.14, 0.01, 0.13 and 0.24 for Sids's parent; while 0.11, 0.10 and 0.03 for Pc's parents).

The grain weight per spike of the selected plants from F2 **and BC population:**

In case of grain weight per spike of the selected plants from the these generations, the grain weight per spike range(from 0.95 to 5.80 gm.

7. .l 000-1 r t·-

t was found that [1]000-kernel weight in parents were 54.35f, 55.113, 60.823, 57.715, 51.050 and 56.730 gm for hexap.oid wheat (Sids 4, Sids 5, Sids 6, Sids 7, Sids 8 and Sids 9, respectively) and 25.783, 32.995 and 25.213 for Pc's lines Pc 29, Pc 62 and Pc 63, respectively.

The standard errors of parents also revealed highly signifizant differences (0.41, 0.29, 0.94, 0.63, 0.12 and 0.16 for Sids's parents while 0.72, 0.91 and 0.22 for Pc's parents).

The [1]000-kernel weight of the selected plants from F_2 and BC pc pulations:

Generally, In case of [1]000-kernel weight of the selected plants from the segregated generations, the [1]000-kernel weight range from 24.10 to 71 gm.

2c't itolo /ical studies on the chromosomal number in nitosis usin C-bandin technique .:-

';omatic chromosomes were counted on seed samples from 5orne promising segregant plants of F_2 and back crosses populi tions under study and the two sets of parents (Sids parents and Pc's parents) beside the rye variety (Petkus). It was r.vealecl that different chromosomal number in these segreg ants (41+1 translocation). Every chromosome pair is characterized by a specific banding pattern. 1R, 2R, 3R, 4R, 5R, 6R and 7R are the 7 pairs of the genome R of rye parent. Each 1-ornosome had its identity as it differ from the other chromosomes in distribution of bands, position of centromer and the length of the two aims. The results obtained from the extensive study of mitotic chromosome variation in a number of segregant plants from the F_2 and back crosses populations

obviously indicate that these segregants were cytologically had a the translocated segment (5RL.5AS) in case of using Pc 29 as parent (4BS.4BL-5RL) in case of using Pc.62 as a parent and (5BS.f;BL-5RL) in case of using Pc 63 as a parent.

3. Efficiency of micronutritional genes in translocated wheat lines and their parents:

n rye *(Secale cereale L.),* there are loci on chromosome arm f.RL which give rise to increased copper(Cu)- and iron(F e)-efficiency, respectively. Three different wheat-rye t translcications each harboring a terminal segment of differen C- size of the rye chromosome arm 5RL were identified by bandir g technique: Pc 29 (5AS/5RL), Pc 63 (5BS.5BL-SRL) and Pc 62 (4BS.4BL-5RL). The translocation break points were obsen ed by chromosome C-banding technique and the sizes of the Ty e chromosome segments involved were determined by karyot ype analysis. The cu-efficiency gene (Ce) was physically mappe d to the terminal region of 5RL, and the genes for mugin cic acid and for hydroxymugineic acid synthetases involved in the strategy II of Fe-efficiency control to two intercE lary regions of 5RL. In all wheat-rye translocation lines the C.?,' gene is linked to the dominant hairy neck character from iye ('Hal'). This morphological trait can serve as proper marke -s for a marker based large-scale selection in wheat breedi

n studying the efficiency of Cu microelement on the u ction Sids parents and Pc parents, it was found that severe red ottle) as in grain weight in spikes of plants free from Cu (3 mg/b comp red to those supplemented with Cu (60 mg Cu/bottle). In wheat lines, the reduction in grain weight ranged from 36.56 % in Sids 4 and 8 up to 40.19 % in Sids 6. Meanwhile, The red ction in grain weight was ranged from 21.06 % in Pc 63 up to 46.4.5 % in Pc 29.

klthough, in comparison to wheat, translocated Pc lines are preferably planted on light, sandy clay soils with bad nutrient supply, severe iron shortage induced a considerable decrease of fresh matter production in young translocated wheat shoots (Pc lines). The difference between the decrease of fresh matter production in Pc 29 (48.16 %), Pc 62 (61.53 %), Pc 63 (56.01 %) and the decrease of that in wheat (21.22 % for Sids 4 23.89 % for sids 5, 17.65 % for Sids 6, 25.70 % for Sids 7, 29.12 % for Sids 8 and 32.47 % for Sids 9) is highly signifi cant.

since the shoot fresh matter amount cannot solely reflect iron efficiency, the symptom of mild chlorosis was substa ltiated by determining the chlorophyll contents. The respor se to Fe-shortage varied among the Pc lines (12.07 % in Pc 63, 16.97 % in Pc 62 to 53.68 % in Pc 29). Their efficiencies were elevated by genes from the 5RL arm. Meanwhile, The response to Fe-shortage varied among the wheat lines (5.74 % in Sids 4, 2.13 % in Sids 5, 18.76 % in Sids 6, 15.21 % in Sids 7, 19.70 % in Sids 8 and 20.53 % in Sids 9 respectively).

or the segregants selected from the F_2 and BC popuh tion, it was found that the percentage of grain yield decrease ranged from 25.91 % up to more than 50.00 % due to the lack of Cu in liquid media. Meanwhile, the percentage of fresh weight was reduced due to the lack of iron (Fe) in liquid media The response to Fe-shortage through the determination of the chlorophyll contents varied among the selected plants.