GENETIC VARIATION IN SALINITY TOLERANCE AMONG BREAD WHEAT DOUBLED HAPLOIDS

By

OLA MOSAAD MOHAMED ABD EL-ALEEM
B.Sc. Agric. Sci. (Agronomy), Fac. Agric., Cairo Univ., 2009

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Submitted in Partial Fulfillment of the Requirements for the Degree of

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APPROVAL SHEET

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SUPERVISION SHEET

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Title of Thesis: Genetic variation in salinity tolerance among bread wheat doubled haploids
Supervisors: Dr. Ahmed Medhat Mohamed Al-Naggar
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ABSTACT

Field, greenhouse and laboratory experiments were conducted from 2011/2012 to 2013/2014 seasons to screen 121 wheat (*Triticum aestivum* L.) genotypes (117 doubled haploids derived from a cross between the Egyptian salt tolerant cultivar Sakha 8 and the promising high yielding line L 25, the two parents and the two check cultivars Sakha 93 and Sids 1). The objectives were to find out good donors to improve salt tolerance for Egyptian genotypes and to describe the effect of elevated salinity level on germination, seedling, plant growth and yield attributes, heritability and genetic advance from selection. Four salinity levels, *i.e.* control, 3000, 6000 and 9000 ppm NaCl were used in laboratory and pots (greenhouse) experiments. Field experiments were carried out at Serw (EC_e = 9.4), Sakha (EC_e = 5.5 – 5.7) and Gemmeiza (EC_e = 2.4). In all experiments, data were combined across two seasons. In general, elevated salinity level caused a significant reduction (starting from 6000 ppm and above) for most studied germination, seedling, agronomic and grain yields attributes, but caused a significant increase in germination time (delay), root: shoot ratio, harvest index, days to heading and to maturity (delay). Heritability in the broad sense decreased as salinity increased. The optimum environment to gain the highest genetic advance from selection was that of 7000 ppm NaCl in pots. The traits showing high heritability, high genetic advance and a strong association with salinity tolerance were shoot fresh weight (SFW), shoot dry weight (SDW), root fresh weight (RFW), shoot length (SL), number of teller per plant (NTPP), number of spike per plant (NSPP), grain felling (GFR) and harvest index (HI), which were recommended as selection criteria for salt tolerance in wheat. The DH lines were classified in each experiment into tolerant, moderately tolerant, sensitive and very sensitive genotypes. The best DH lines were identified at germination, seedling and reproductive stages. Pots experiment identified a number of superior DH lines over the best check at the 9000 ppm NaCl level, but the same DH lines were not identified in the field experiments with few exceptions, indicating that the final evaluation should be done in the field of naturally salt affected soils. Further field experiments should be conducted in order to get firm results and conclusion on the most salt tolerant and high yielding DH lines for each region.

Key words: Wheat, Salinity tolerance, Doubled haploids, Heritability, Field screening, Germination, Seedling attributes, Pot experiment.

DEDICATION

I dedicate this work to whom my heartfelt thanks; TO MY MOTHER ***Mis. SALWA ABD EL-MAGEED****, MY FATHER* ***Prof. Dr. MOSSAD ABD EL-ALEEM*** *Wheat Breeder AND TO MY FIANCE* ***Dr. MOHAMED EL-BOSILY*** *Associate Researcher Barley Res. Dept., MY BROTHER* ***Capt. AHMED*** *Maritime Pilot, MY SISTER* ***Ms. MARIAM*** *Egyptian Archaeologists Union AND MY SISTER IN LOW* ***Mis. EBTIHAL*** *for their patience and help, as well as to My friends for their lovely offered support along the period of my post graduation.*

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CONTENTS

CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES