

# **MOLECULAR GENETIC STUDIES ON SOME DROUGHT AND SALINITY TOLERANCE GENES IN BREAD WHEAT**

**By**

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### ABSTRACT

The aims of this study were identifying of some wheat varieties and double haploid response to drought and salinity stress to determine and isolation of tolerant genes and select a gene for cloning it in tobacco plant. The behavior of seven wheat (*tritium aestivum*) genotypes under salinity and drought stress was studied. The genotypes used were double haploids (DH1, DH2, DH3 and DH4) and local varieties (Sakha93, Sids1 and Gemmeza9) and relative water content (RWC) was estimated for the varieties and DH under drought stress 30% polyethylene glycol 6000, after 72 hours of treatment, The genotypes DH4 had the higher RWC (91.93%) while Sids1 had the lowest RWC of 68.23%. under water stress 30% PEG-6000. While, at salinity level 2.5% NaCl, DH3 displayed the highest relative water content (92.71%) and Gimmeza9 had the lowest RWC 75.88%.

Using primers and polymerase chain reaction (PCR) technique, the genes *WZY2*, *WUB3*, *ZFP22*, *TaOF1b*, *STRP* and *Di19a* were detected in all genotypes and gave fragments with MW. 194,234,182,204,228 and 747bp respectively, with variance expression between different genotypes. Three genes were selected for study the expression of whole sequence genes. DH4 the highest RWC genotype under drought stress and DH3 was had the highest RWC genotype under salinity stress at different times 0, 3, 6,12,24,48 and 72h, in leaves and roots, The *wzy2* gene appeared 474bp which varied in expression between leaves and roots, while *STRP* with 879bp appeared in DH4 in root only at 48h, however in DH3 under salinity stress no gene expression was appeared. On the other hand, *Di19a* with 747bp appeared in DH3 at 24 and 48h under salinity stress. The three genes were isolated and the sequences of the genes were compared with genbank, *wzy2* gene was selected and cloned by carried on pBi121 vector, propagated in *E. coli* and transformed in tobacco leaf disc mediated Agrobacterium by using tissue culture technique the callus, leaves and roots were obtained, the whole plant was transferred to adaptation. The transformed *wzy2* gene was detected using PCR reaction technique by using primers compared with control.

**Key words:** wheat, *tritium aestivum*, drought and salinity stress, relative water content, cloning, agrobacterium, transformation.

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## LIST OF ABBREVIATIONS

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6BA	6-Benzylaminopurine
ABA	Absisic acid
bZIP	basic region/leucine zipper protein
CaMV35s	Cauliflower Mosaic Virus promoter
CIMMYT	International Wheat and Maize Improvement Center
DMSO	Dimethyl sulfoxid
DH	Doubled Haploid
DHNS	Dehydrin (DHN) is a multi-family of proteins present in plants
GTC	Guanidine thiocyanate
GUS	$\beta$ -glucuronidase
HR	Hypersensitive response
IAA	Indole-3- acetic acid
LEA	Late embryogenesis abundant
MS	Murashige and Skoog media
NOS	Nopaline synthase terminator which induce termination process rate
<i>NPTII</i>	Neomycin phosphotransferase
PCD	Programmed cell death
PEG	Polyethylene glycol
ROS	Reactive Oxygen species
RWC	Relative water content
SA	Salicylic acid
SOS	Salt overlay sensitive genes
STRP	Salt Tolerance Related Protein
SUMO	Small Ub-related modifier
TFS	Transcription factors
Ub	Ubiquitin proteins
UPS	The ubiquitin 26S proteasome system
USDA	United States Department of Agriculture
ZFP	Zinc finger protein
DH	Double Haploid

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