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The response to salt stress application of durum wheat-*Thinopyrum* spp. recombinant lines based on morpho-physiological and biochemical parameters



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## Introduction

Combating the effects of climate change and environmental deterioration on

Plant material and	stre	SS CC	onditi	ons	
DURUM WHEAT RECOMBINANT AND CONTROL LINES	SALT STRESS CONDITIONS				
Wheat-alien (Thinopyrum spp.) recombinant and control lines	Sowing	Transfer to	Acclimation	Application of	Sample

the wheat crop by widening its genetic basis is a distinctive objective of PRIMA project IMPRESA. In this frame, we analyzed the response at early growth stages of durum wheat (DW) recombinant lines (RLs), containing on 7AL arms chromosome portions from wild relatives of *Thinopyrum* genus, to salt (NaCl) stress application in hydroponics. Alien introgressions consist of *Th. ponticum* 7el<sub>1</sub>L short segments and of some such segments with embedded *Th. elongatum* 7EL fractions (7el<sub>1</sub>L+7EL).

Line designation	Wheat-Thinopyrum recombinant line	Recombinant chromosome	% Thinopyrum
R5 +	T. durum 7AL/Thinopyrum ponticum 7el <sub>1</sub> L = 7AL/7el <sub>1</sub> L	0	23 7el <sub>1</sub> L
R5 –	control line	- (normal 7A)	
R112 +	7AL/7el1L		28 7el1L
R112 -	control line	- (normal 7A)	_
R23 +	7AL/7el1L		40 7el <sub>1</sub> L
R23 -	control line	- (normal 7A)	
R69-9/R5 +	T. durum 7ALIThinopyrum ponticum 7el <sub>1</sub> L + Thinopyrum elongatum 7EL = 7ALI7el <sub>1</sub> LI7EL	0	Total 23%, ~ 10% 7EL
R69-9/R5 -	control line	— (normal 7A)	—
R69-9/R112 +	7AL/7el1L/7EL °	0	Total 28%, ~ 10% 7EL
R69-9/R112 -	control line	— (normal 7A)	—
R74-10/R112 +	7AL/7el1L/7EL		Total 28%, ~ 20% 7EL
R74-10/R112 -	control line	_	_
Om Rabia (OR)	Tunisian T. durum salt tolerant variety		



Seven days after germination, seedlings were transferred onto half-strength Hoagland hydroponic solution. For stress treatment, 2-week-old seedlings were treated with 100 and 200 mM NaCl for 3 days.

### Morpho-physiological analyses of durum wheat recombinant lines under salt stress



Morphological attributes of salt tolerant cv. Om Rabia (OR), recombinant (RLs) and control (CLs) lines grown under control and stress conditions indicated noticeable effects of salt stress on plant growth and development. RLs displayed better plant growth and a significant water uptake ability compared to CLs. Good plant health of RLs was also evident from high values of metabolites involved in photosynthesis (chlorophyll) and in response to osmotic stress (proline)

# Na<sup>+</sup> and K<sup>+</sup> accumulation in plants grown in standard conditions or subjected to salt stress



Sodium and potassium contents were analyzed in roots and leaf blade of cv. Om Rabia, recombinant and control lines by flame spectrophotometry. Na<sup>+</sup> content in leaf blade of CLs (not carrying any *Thinopyrum* introgression) was significantly higher than that of the RLs, suggesting that the latter are able to control the retrieval of Na<sup>+</sup> from the xylem ascending sap upon salt stress.

### **Oxidative stress and antioxidant activities**



Activity of antioxidant enzymes (CAT, SOD, POD, APX) was remarkably increased in recombinant lines and Om Rabia compared to control lines, while accumulation of malondialdehyde (MDA) and hydrogen peroxide  $(H_2O_2)$  was significantly lower.



#### as well, are suitable tools to face multiple environmental challenges, including salinity.