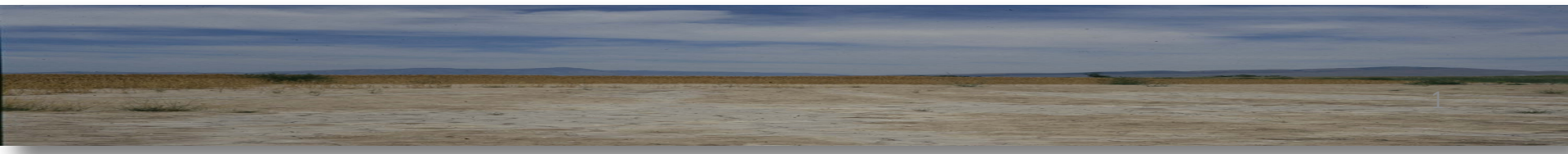




Elevated Potassium Fertilization Improves Wheat Growth and Yield under Salt Stress

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Use of K for to Combat Salt-stress

- ❑ Potassium addition **improved plant K-concentration** and the **growth** of salinized barley plants (*Helal and Mengel, 1979*).
- ❑ Adequate supply of K may **contribute greatly to plants survival** under saline-sodic conditions (*Marschner, 1995*).
- ❑ Decreased biomass and chlorophyll content under salt stress was **improved by foliar application of K** (*Kaya et al., 2001*).
- ❑ 40 mg K kg⁻¹ soil **increased brassica biomass** under 80 mM of NaCl stress (*Umar et al., 2011*).

Use of K to Combat Salt-Stress

Potassium fertilization **did not** eliminate the deleterious effects of salinity on corn yield and potato, **despite increased K^+ and decreased Na^+** concentration in the plant tissue.

(Bar-Tal et al., 1991; Alhagdow et al., 1999; Holthusen et al., 2012)

Potassium Role under Salt Stress

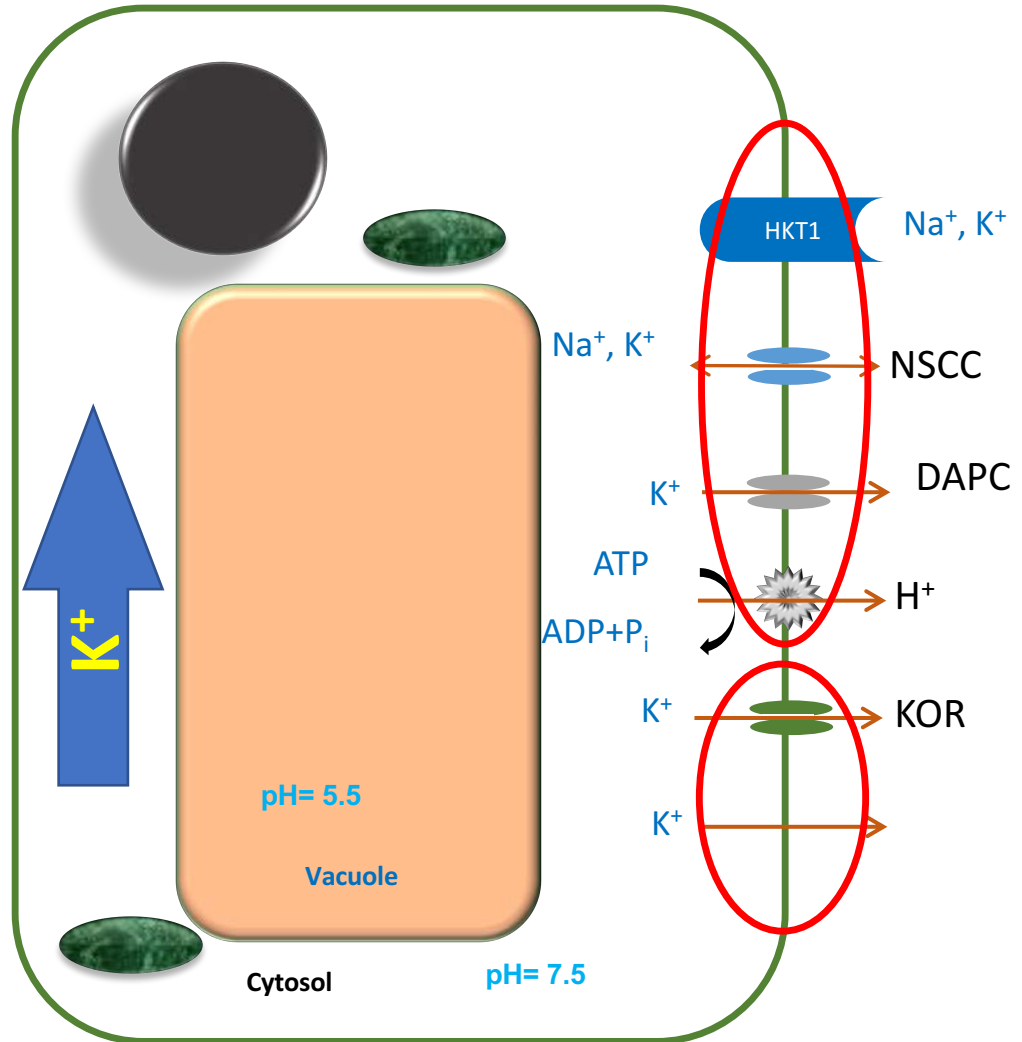
Exogenous K^+

Regulate the K^+ channel transporters

Elevates cytosolic K^+

Internal K^+ Stores

Maintains or increases water uptake or retention



Maintains or increases salt resistance

Effect of elevated K-fertilization on wheat growth under salt stress

Location:

Wire house, Faisalabad, Pakistan

Variety:

FSD 2008

K⁺ levels (K₂SO₄):

2.2, 4.4, 8.8 mM K⁺,

No. of Replications:

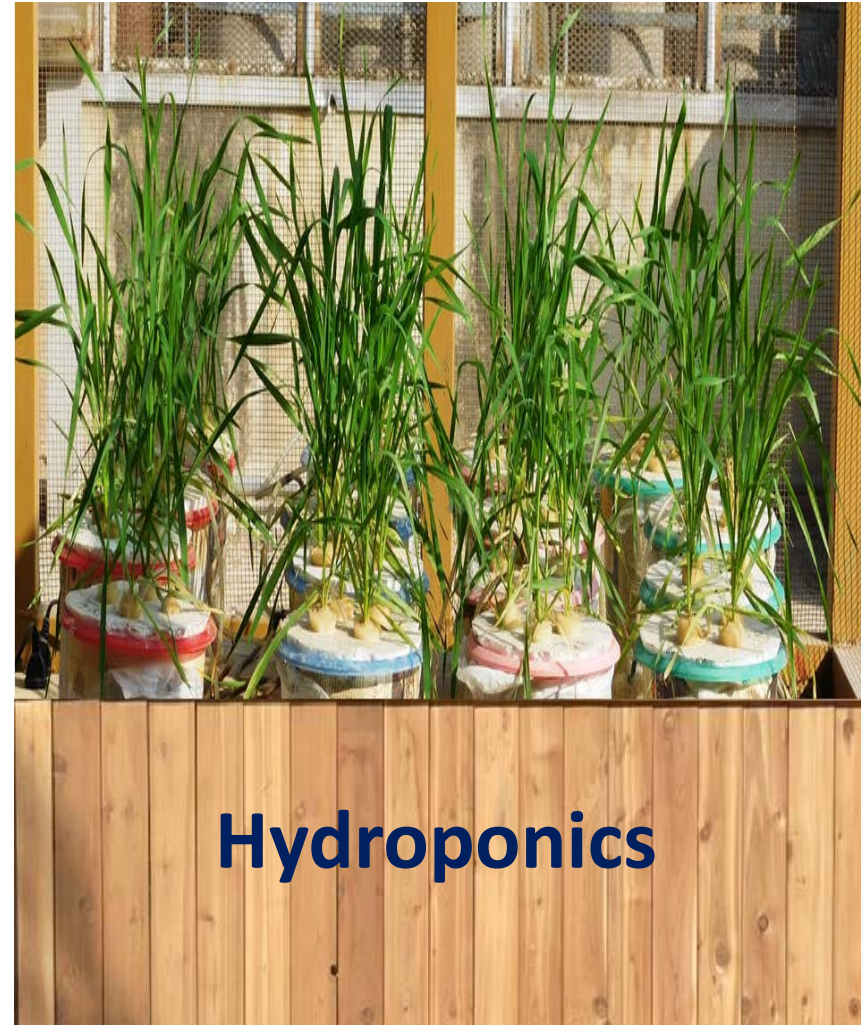
Four

Salt stress:

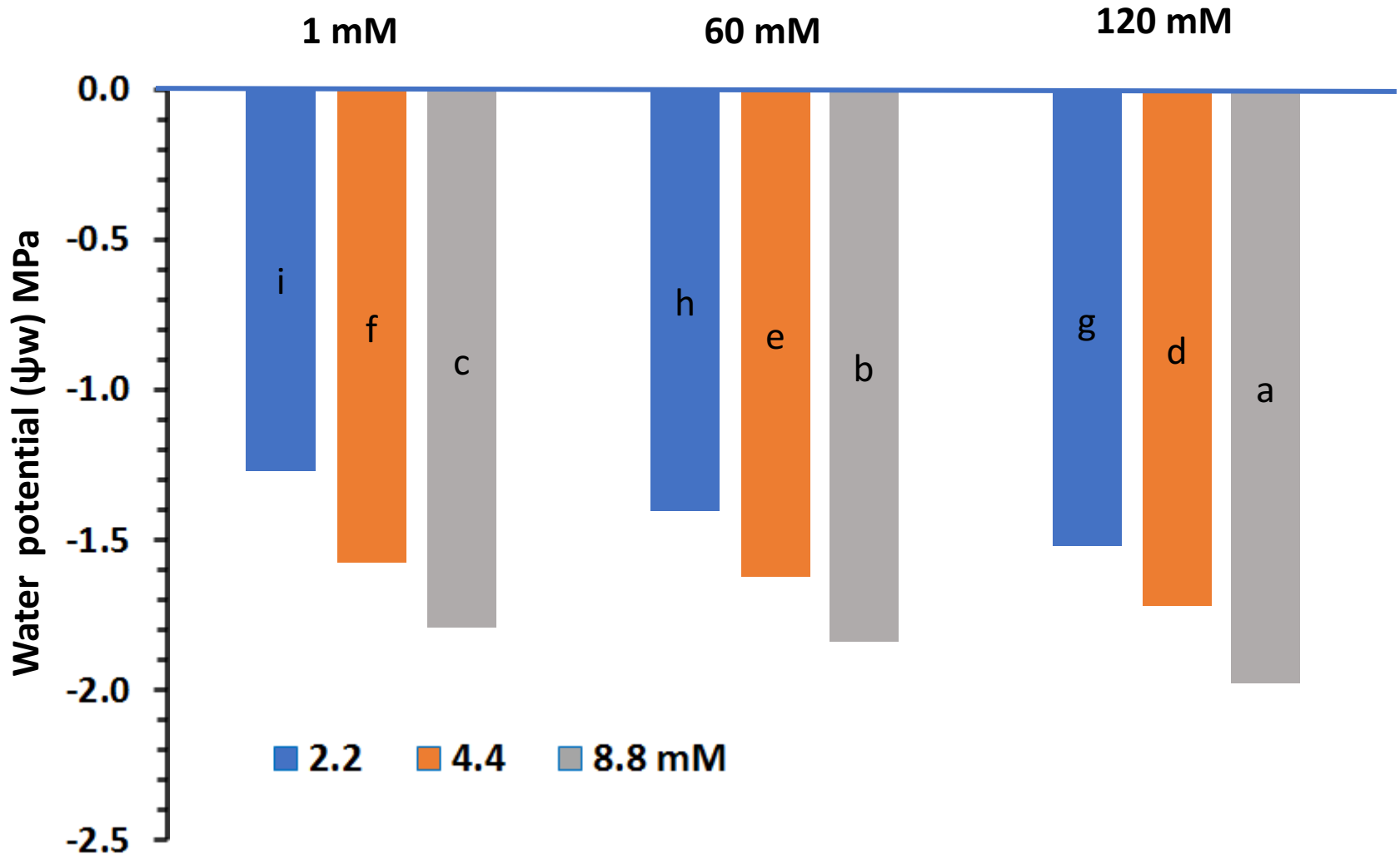
1, 60 and 120 mM NaCl was applied
2 weeks after transplanting.

Harvesting:

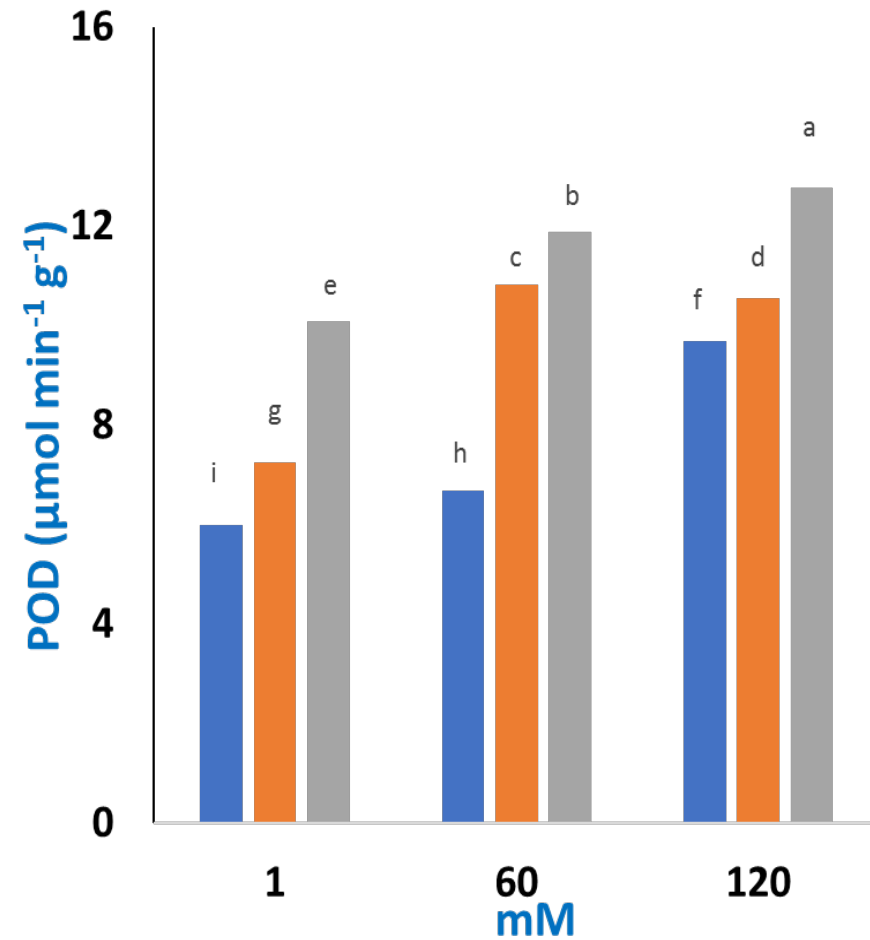
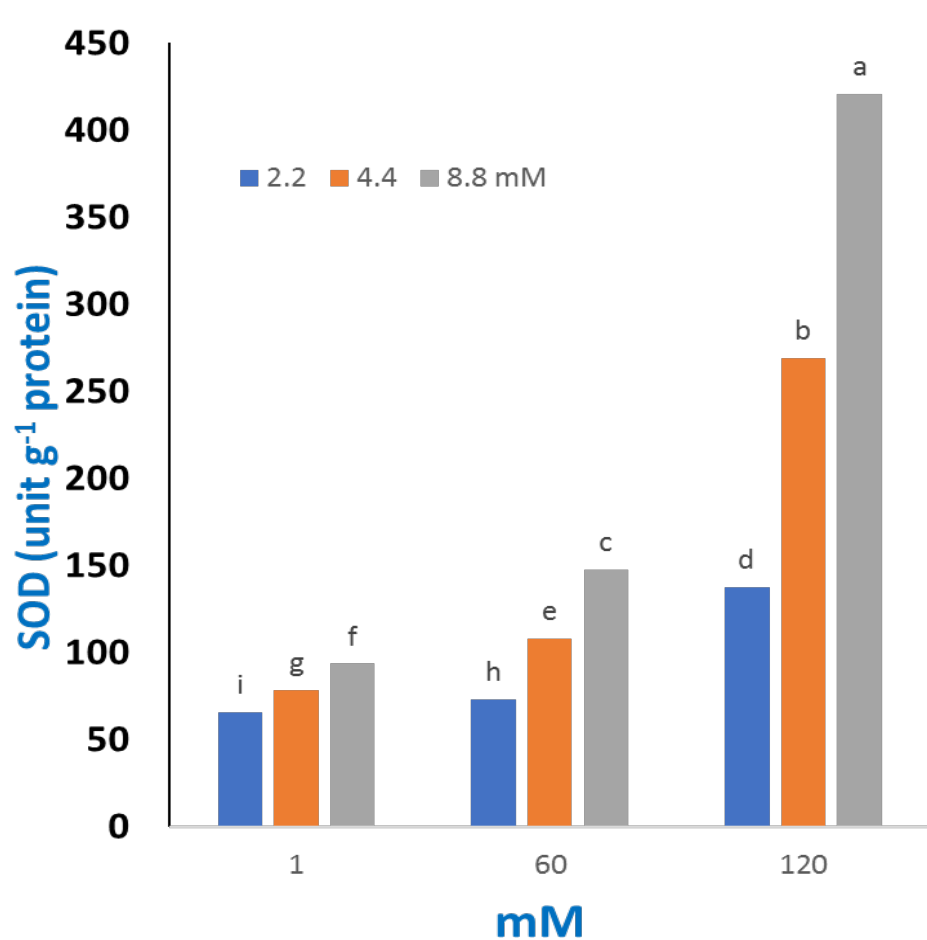
6 weeks after treatment application



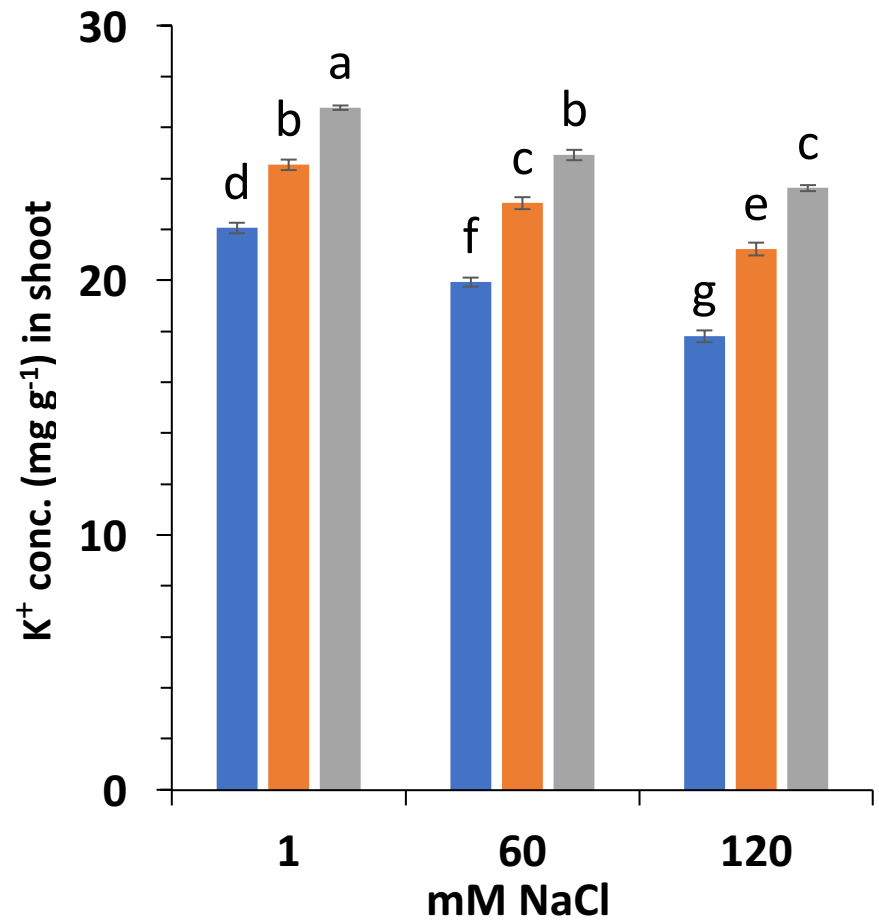
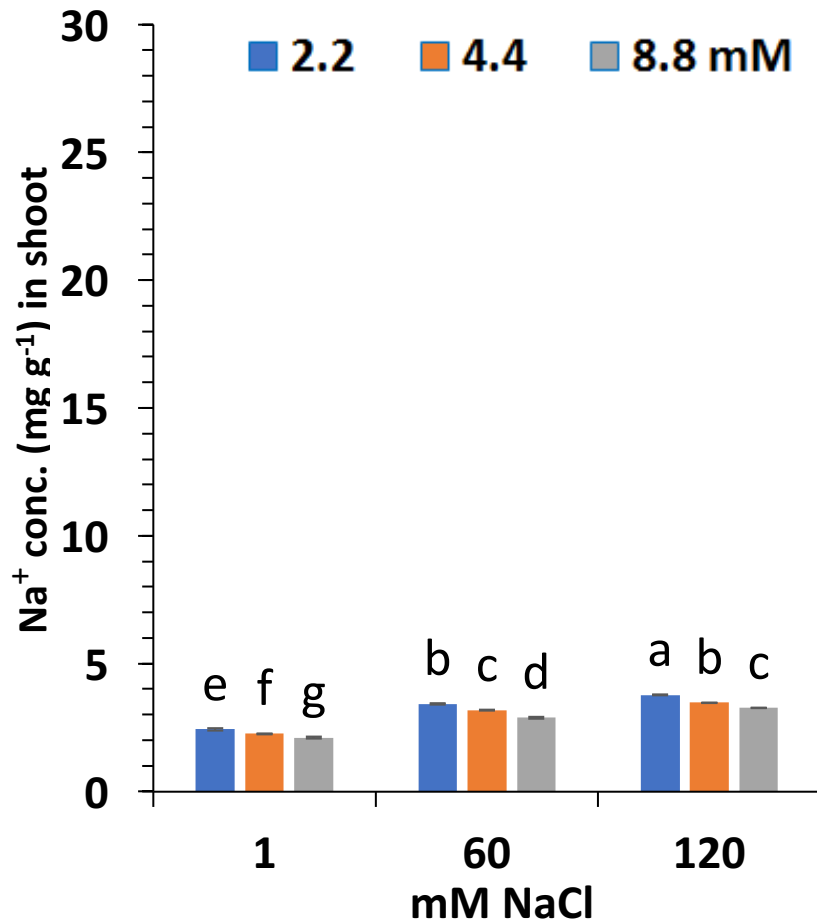
Effect of elevated K application on osmotic and water potential of wheat leaf under salt stress



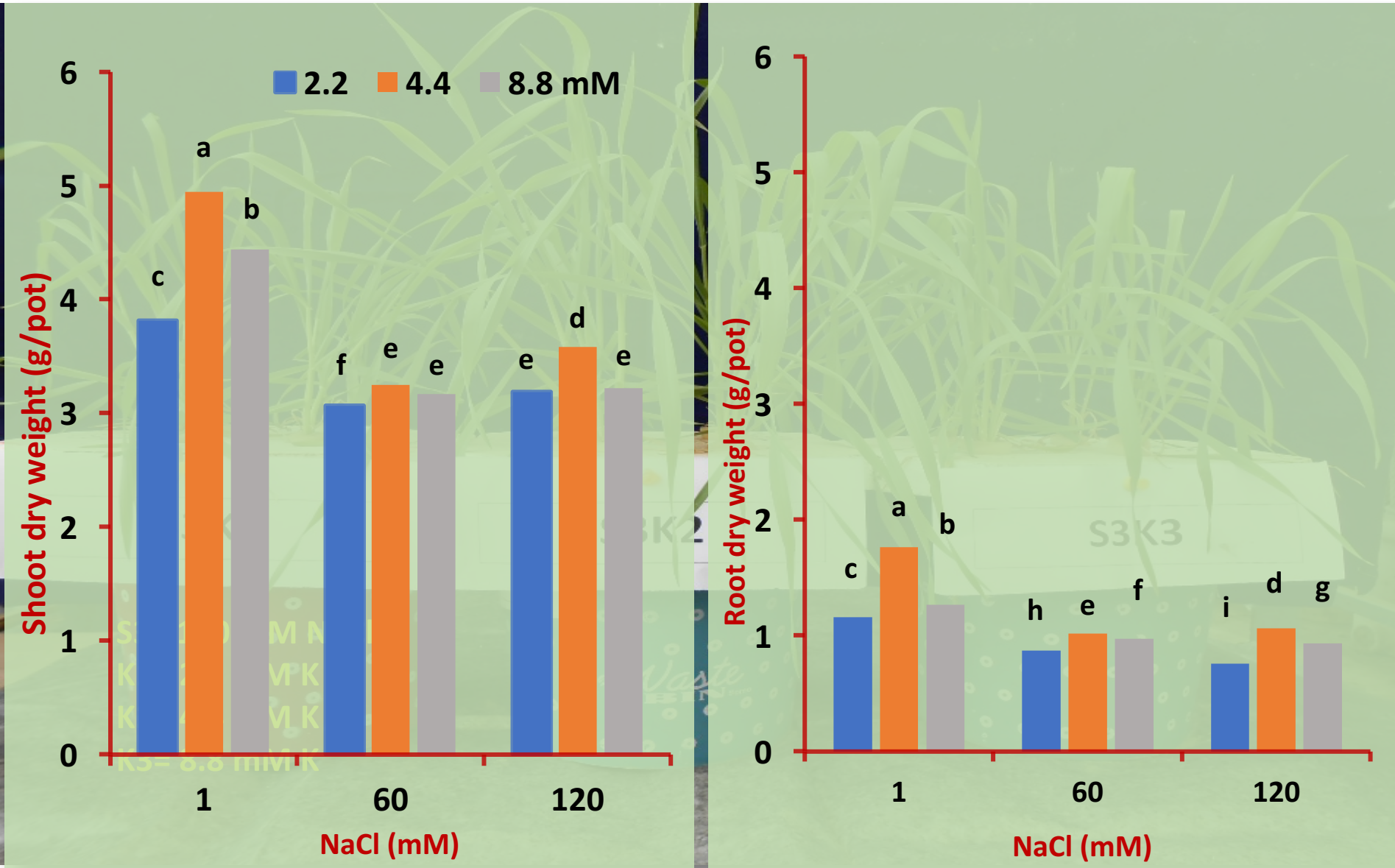
Effect of K on antioxidant enzymes (superoxide dismutase (SOD: Unit/g protein) and peroxidase (POX:($\mu\text{mol min}^{-1} \text{g}^{-1}$) in the leaves under salt stress



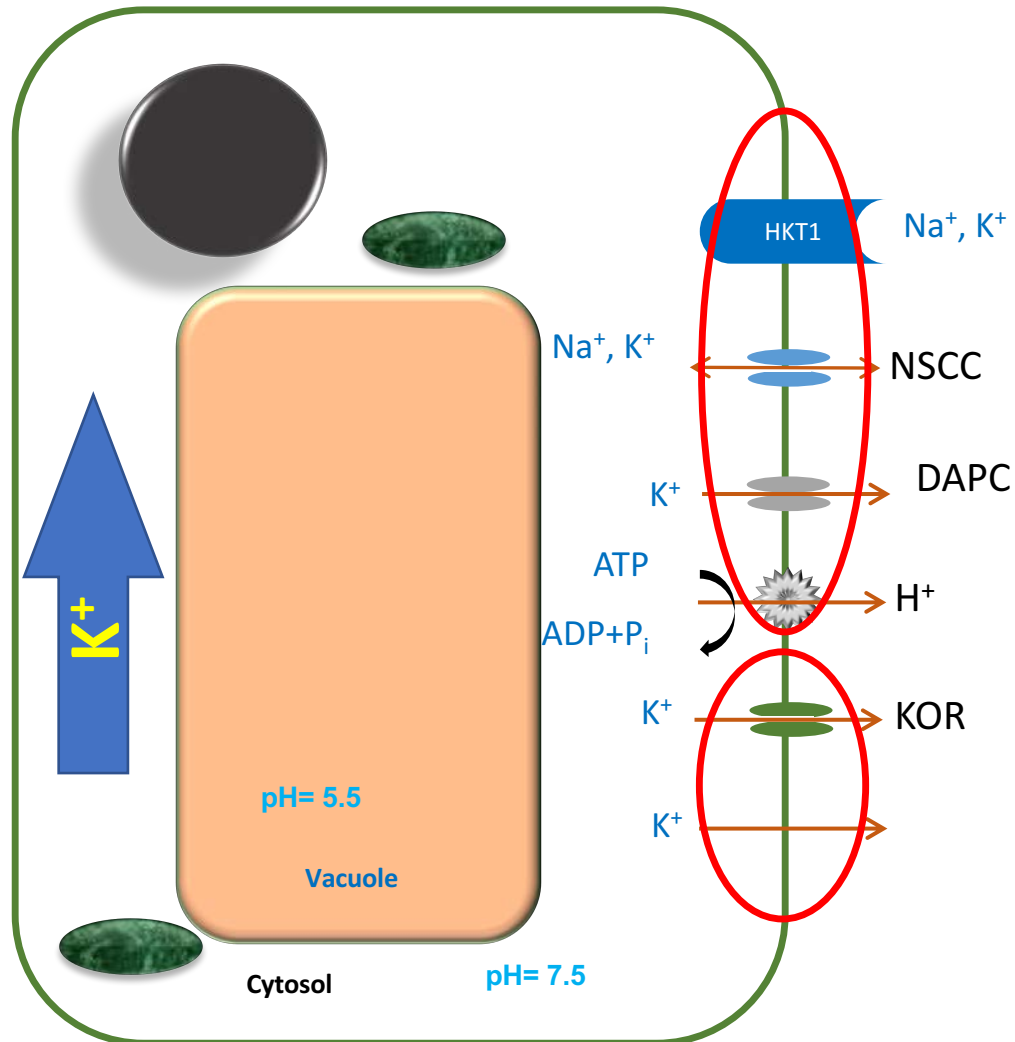
Effect of elevated K application on Na⁺ concentration in shoot of wheat under salt stress



Effect of elevated K application on shoot and root Dry weight of wheat under salt stress (g/pot)



Whether decreased Na^+ and increased K^+ in plant tissue represent their concentration in metabolically active parts of plant cells?



Effect of elevated K-fertilization on subcellular Na^+ / K^+ dynamics (SBFI-AM) in wheat under salt stress

Salinity levels

0 and 100 mM

Variety

FSD 2008

K^+ levels (K_2SO_4)

3 , 6, 12 mM K^+

No. of replications

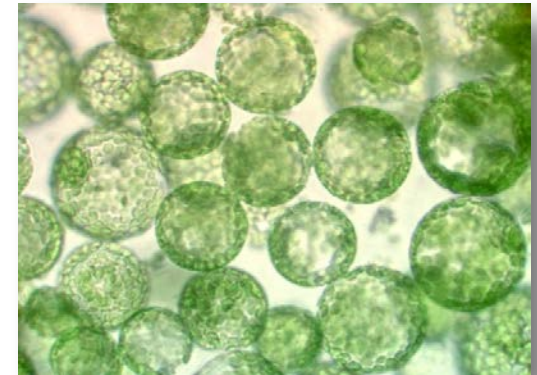
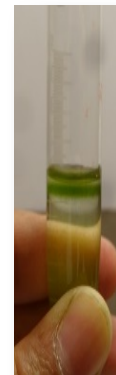
Four

Location

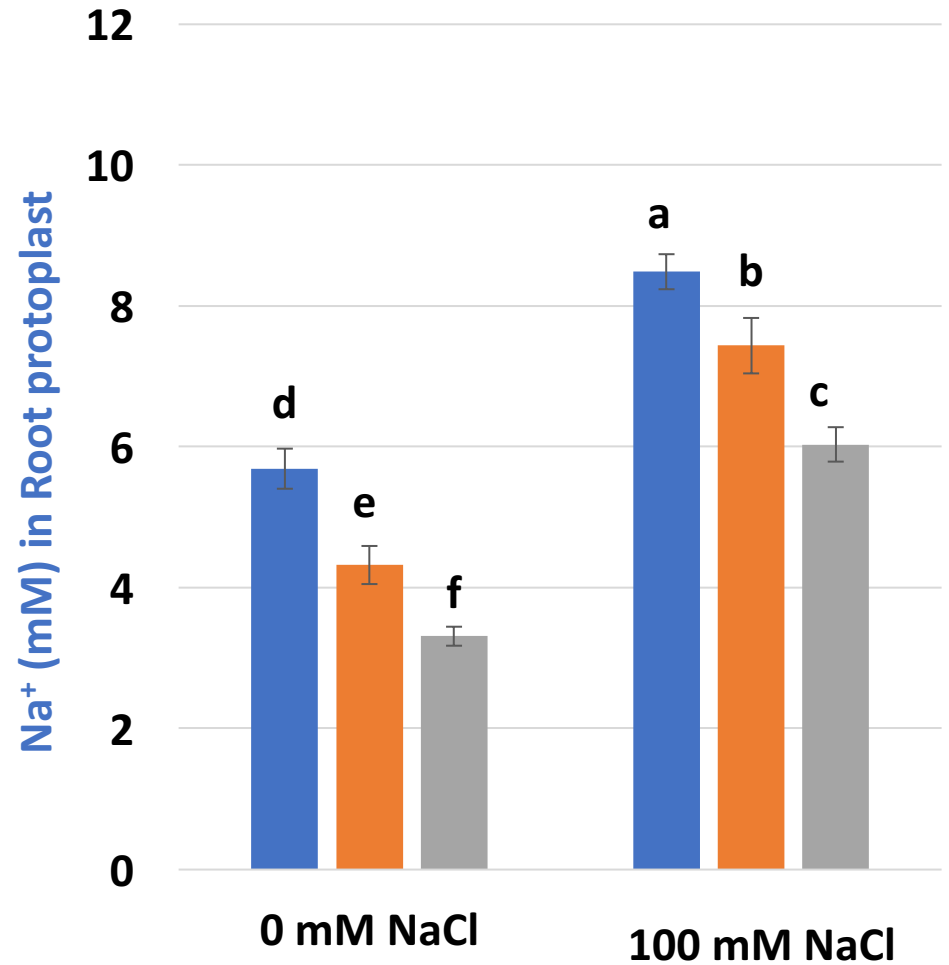
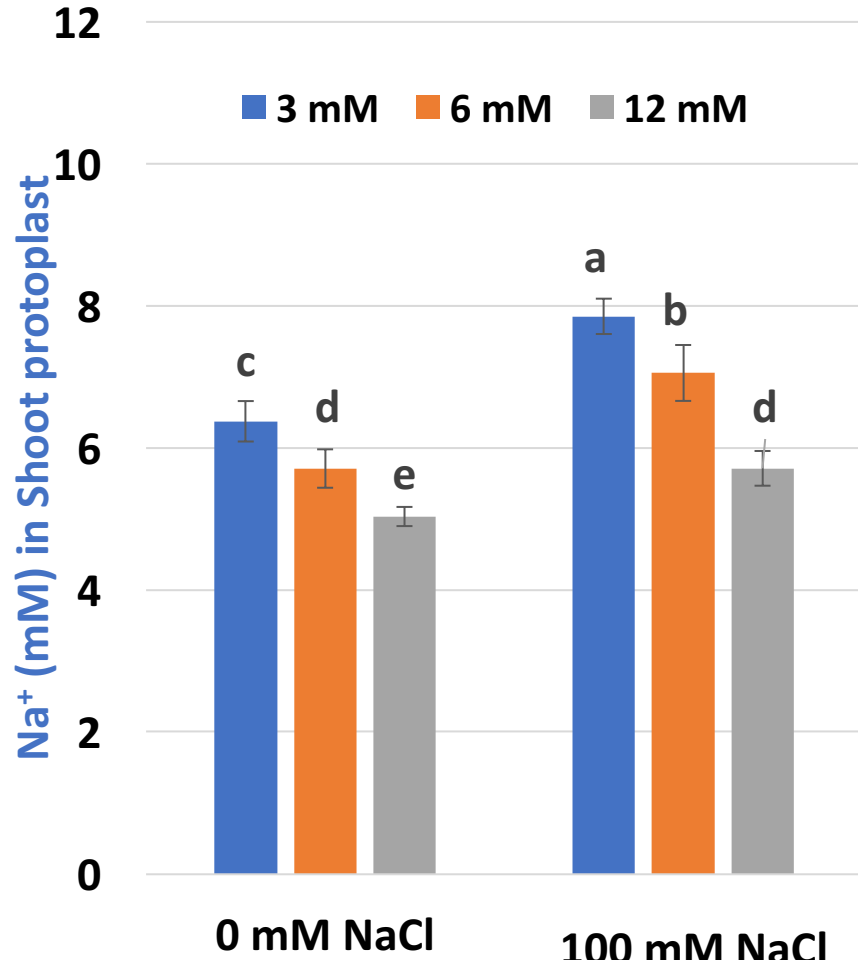
Stockholm University, Sweden

Salt stress (NaCl) was applied 3rd day after sowing.

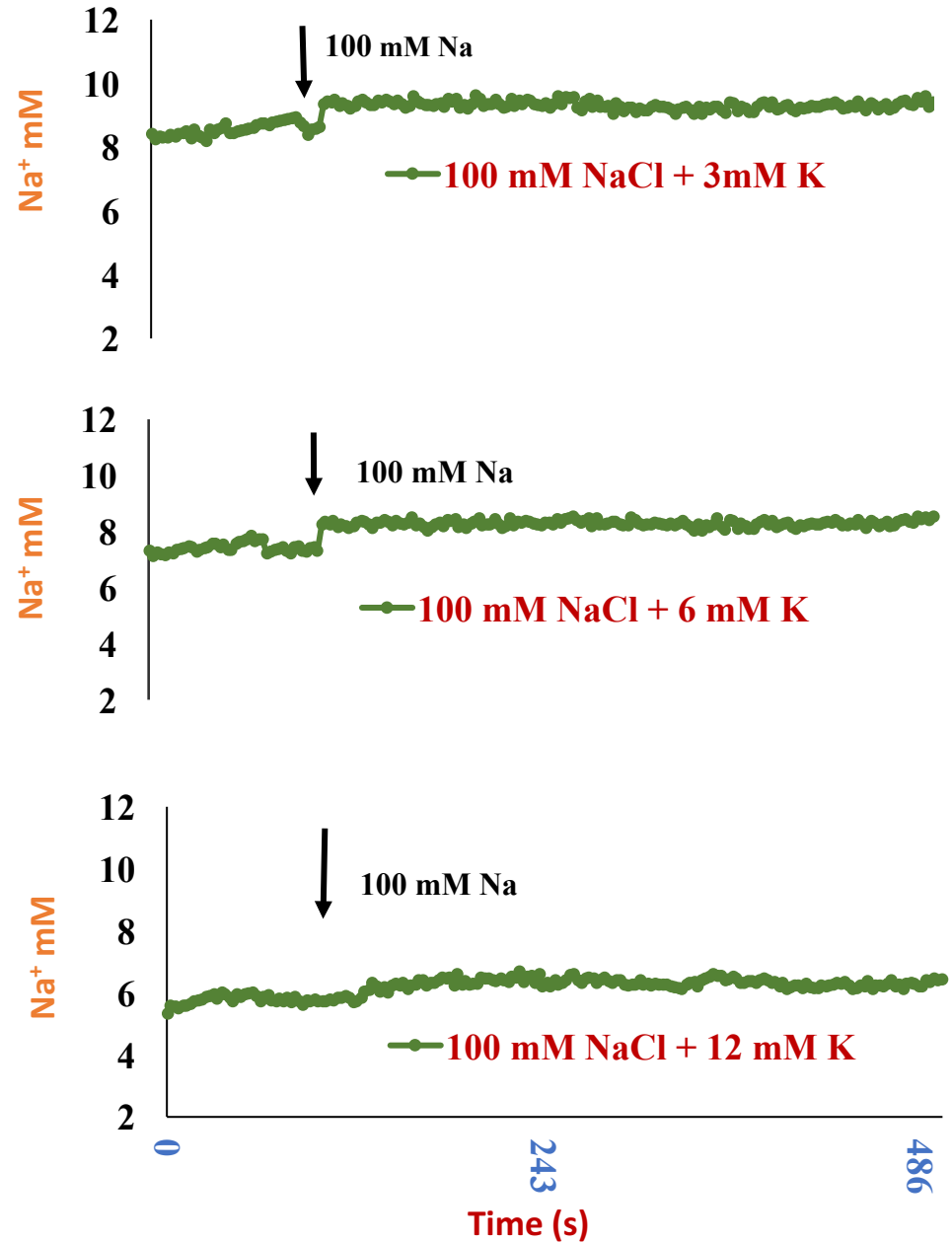
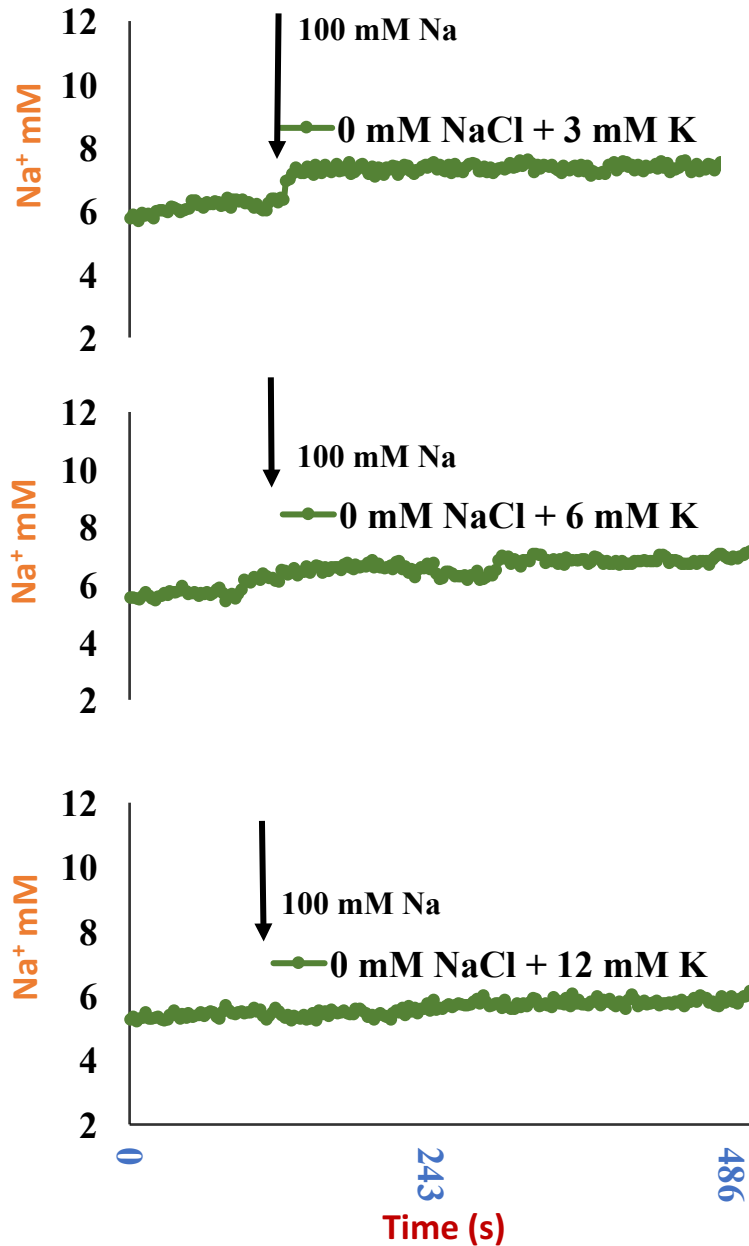
Harvesting: After 6 days



Effect of elevated K fertilization on Na^+ and K^+ concentration in wheat leaf protoplast under salt stress



The $[Na^+]$ in wheat leaf protoplasts by additional 100 mM Na^+ (*in vitro*) into protoplast isolated from different treatments



Determining the effect of elevated K-fertilization on yield of wheat under salt stress

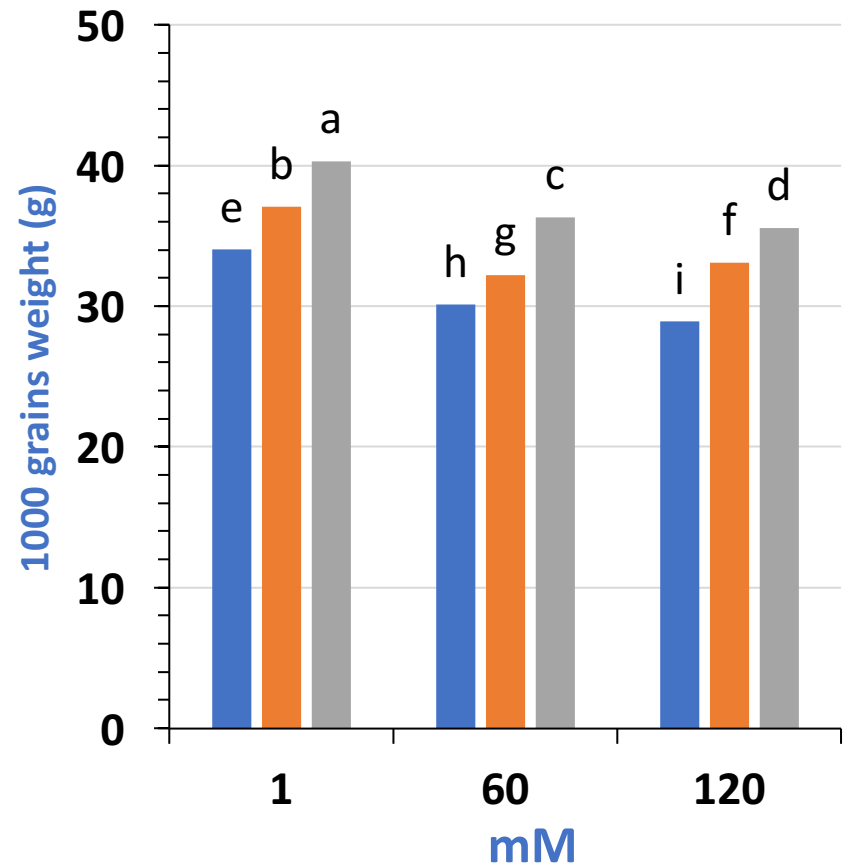
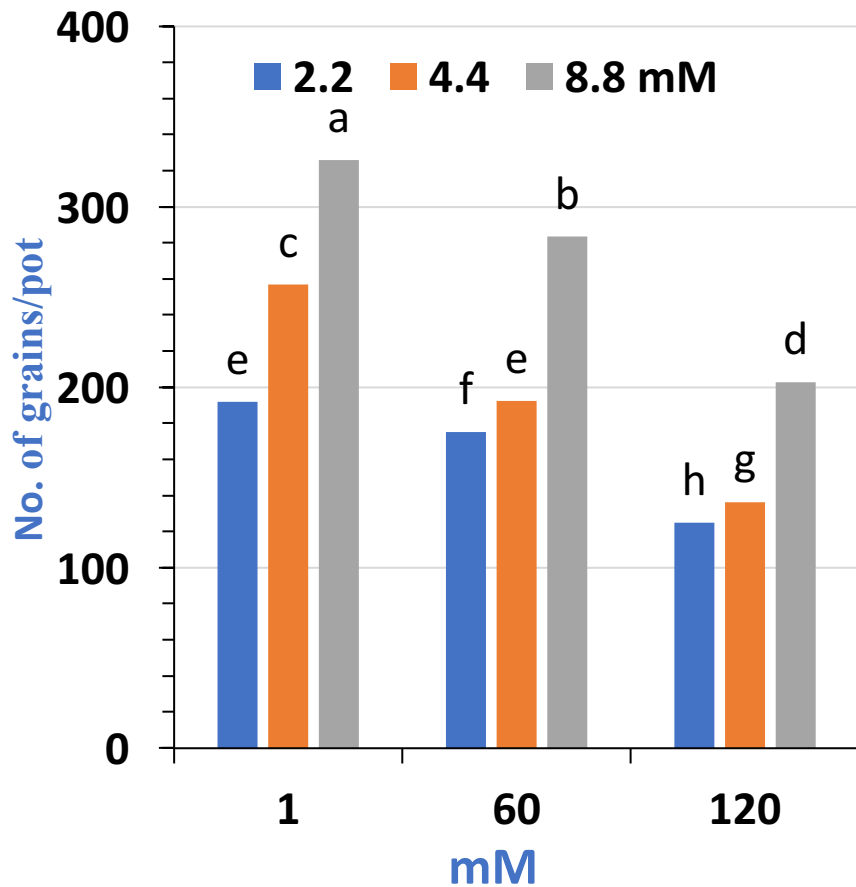
Salinity levels	1, 60 and 120 mM
Variety	FSD 2008
K⁺ levels (K₂SO₄)	2.2 , 4.4, 8.8 mM K ⁺
Location	Wire house ISES
Design	CRD factorial

Salt stress (NaCl) was applied 2 weeks after transplanting.

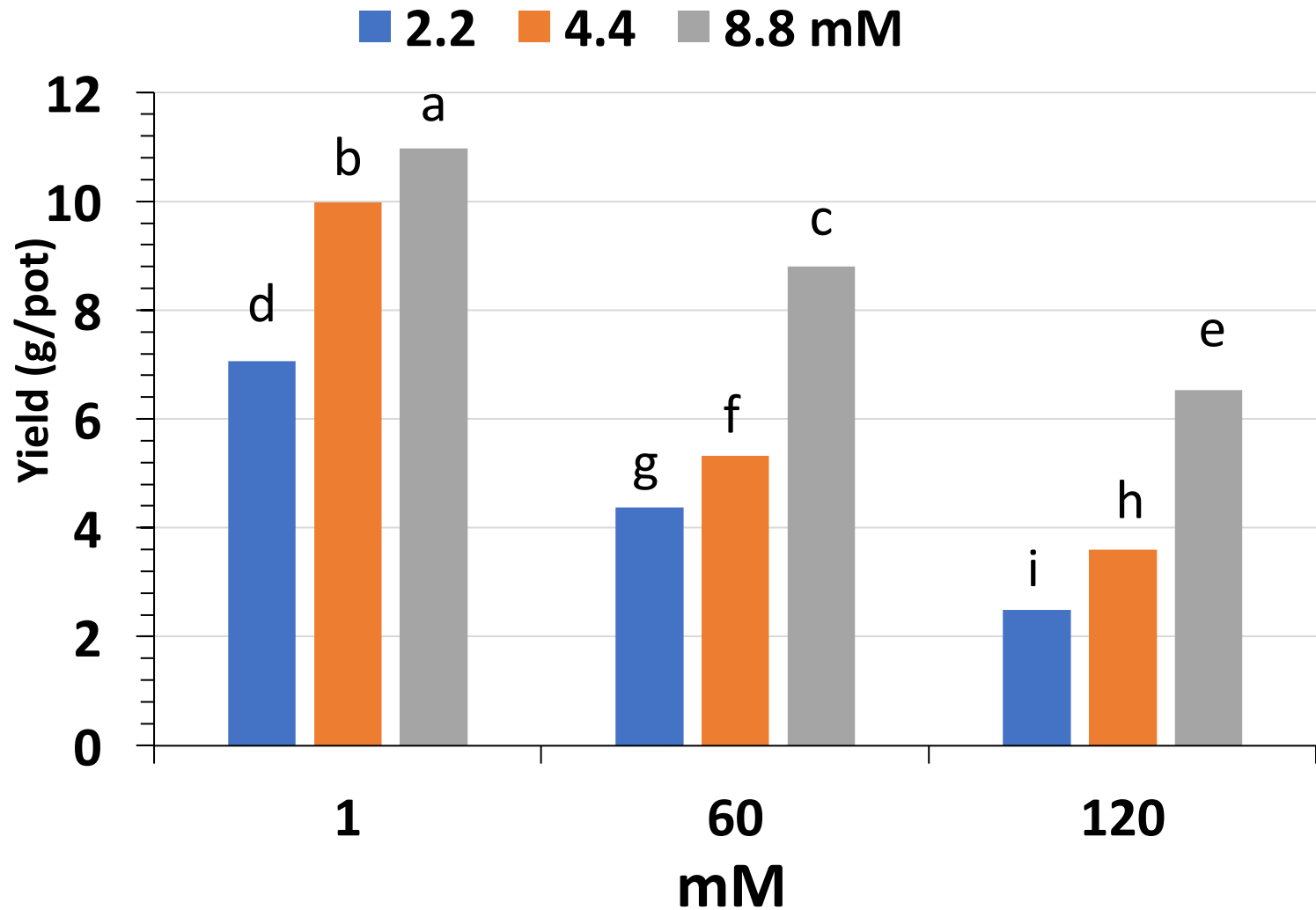
Harvesting: At maturity



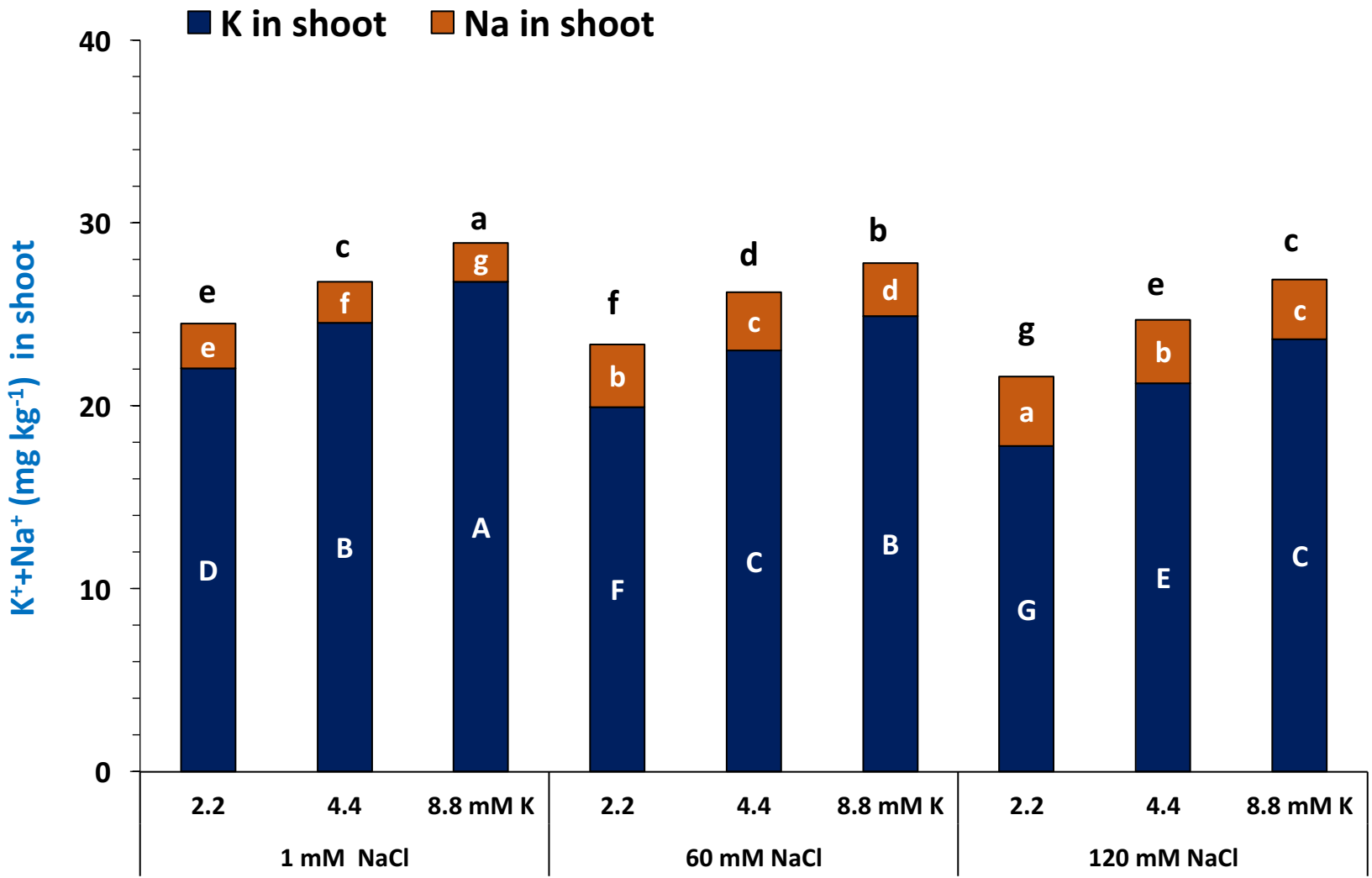
Effect of K fertilization on number of grains/pot and 1000 grains weight of wheat under salt stress



Effect of elevated K fertilization on yield of wheat under salt stress



Effect of elevated K application on relative increase/decrease of K⁺ and Na⁺ in wheat shoot under salt stress



Conclusion

Elevated K-fertilization under salt stress:

- ❑ not only increases K^+/Na^+ in shoot as well as at sub-cellular level
- ❑ increases plant growth as well yield, **however** more pronounced effect on grain yield in wheat

THANKS

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