

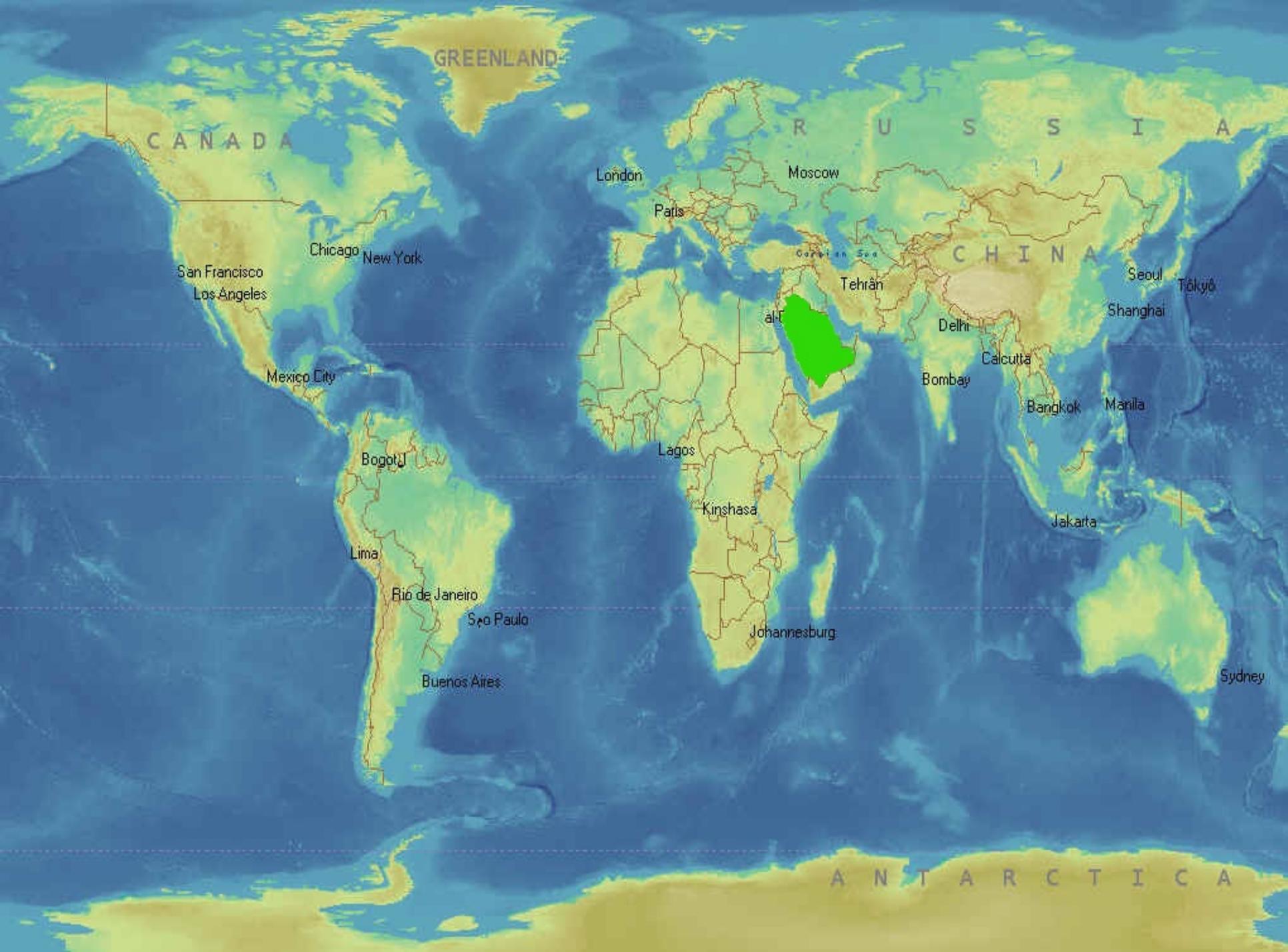


*Enhancement of Germination by Application of Potassium to **Tomato** Seeds Grown in High Salinity Media*

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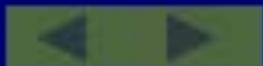
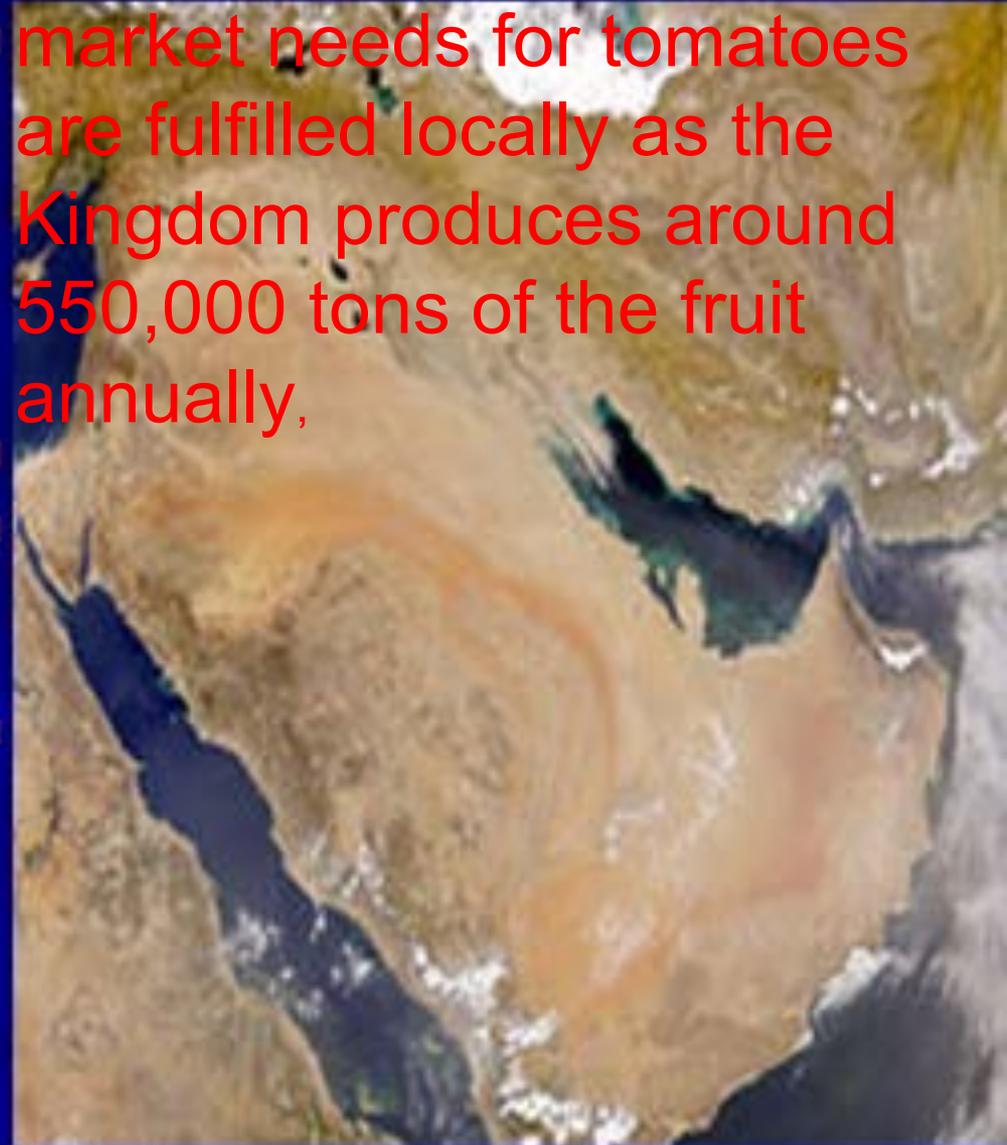
* The area of KSA is more than 2 Millions squared km.

* 80% of Saudi Arabia area is sandy soil.

* Because of harsh weather and shortage of fresh water, PC is very important in KSA.

* With agricultural development, PC increased very rapidly during the past 30 years.

Twenty-five percent of the market needs for tomatoes are fulfilled locally as the Kingdom produces around 550,000 tons of the fruit annually,



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مشاكل التربة



جفاف



ملوحة



تصحّر



طبقة صماء

Salinity action on plants

Osmotic

- Decreases soil water potential, harder for the plant to extract water, effect external to plant, all salts

Toxic

- Toxic ions poison plant metabolism, for example increasing leaf chloride decreases photosynthesis, effect internal to plant

Potassium (K)

1) Soil Relations

- Present in large amounts in mineral soil
- Low in organic soils

2) Plant Functions

- Translocation of sugars
- Activator of many enzymes
- Regulation of water movement across membranes and through stomata (Guard cell functions)

3) Deficiency and Toxicity

- Deficiency: Leaf margin necrosis and browning older leaves are more affected
- Toxicity: Leaf tip and marginal necrosis

4) Fertilizers

- Potassium chloride (KCl)- murate of potash
- Potassium sulfate (K_2SO_4)
- Potassium nitrate (KNO_3)

Potassium and yield

- **High levels of potassium provide high yields in tomato crops, as trial in UK shows.**
- **Tomatoes have a relatively high potassium requirement. There is usually 5.2 to 7.2lb of K taken into the plant for every tonne of tomato harvested.**

Objectives

- The goal of this current study was to develop techniques by adding different concentrations of KNO_3 that may improve seed germination under salinity.

Material & Methods

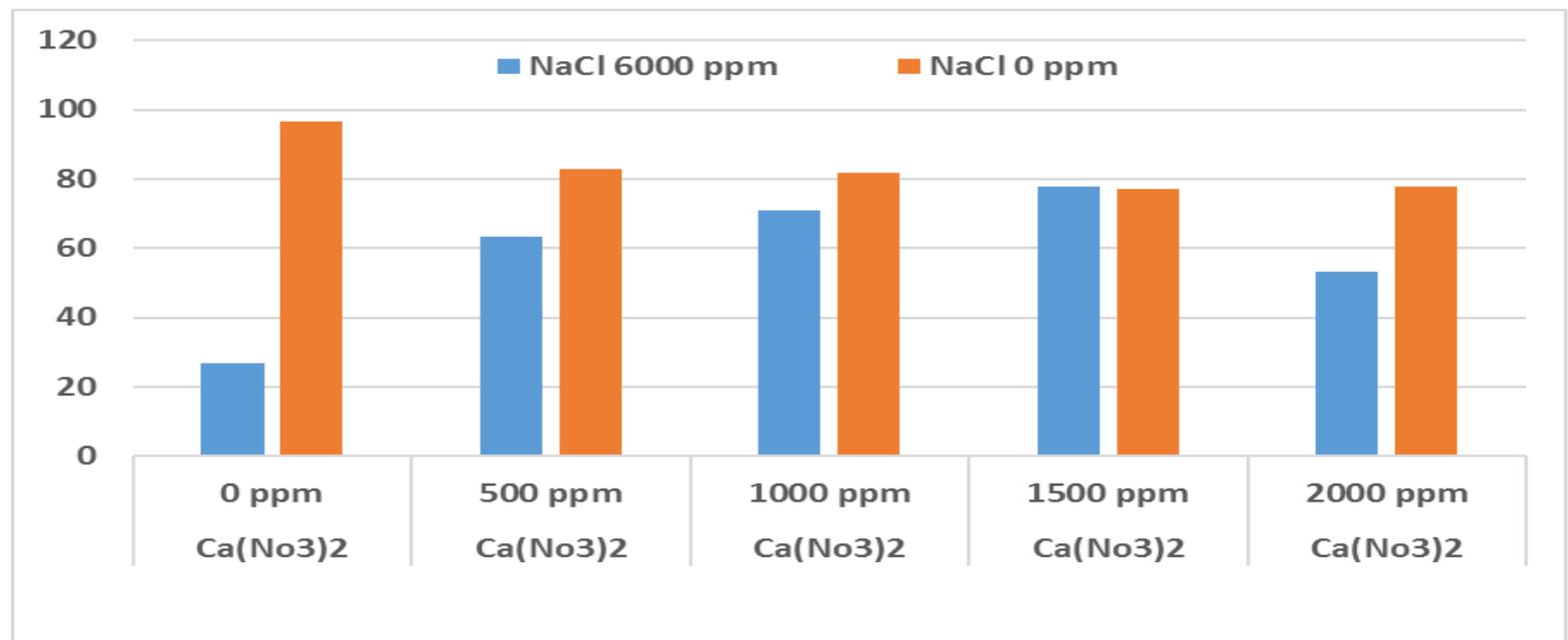
- Tomato seeds (Cv. super Strain B) sown under salinity of 6000 ppm NaCl,
- Five levels of potassium nitrate namely (0, 500, 1000, 1500, and 2000 ppm KNO_3) in petri dishes at 25 °C.
- Five levels of Calcium nitrate namely (0, 500, 1000, 1500, and 2000 ppm $\text{Ca}(\text{NO}_3)_2$) in petri dishes at 25 °C.
- This study was conducted in growth chambers at the Faculty of Agriculture and Veterinary Medicine, Qassim University, Kingdom of Saudi Arabia during March 2015.

Salinity and K treatments



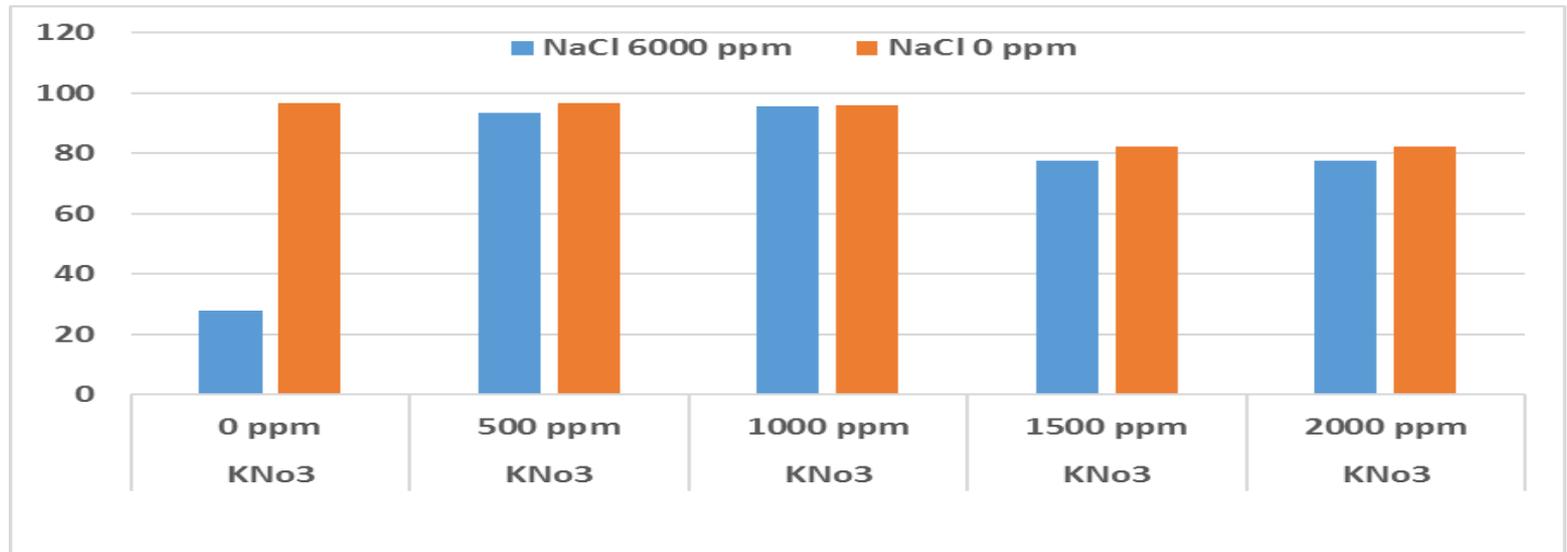
Ca Effects on Germination under Salt stress

NaCl	Ca(NO ₃) ₂				
	0 ppm	500 ppm	1000 ppm	1500 ppm	2000 ppm
6000 ppm	27.0	63.3	71.1	77.7	53.3
0 ppm	96.6	83.0	82.0	77.1	77.7



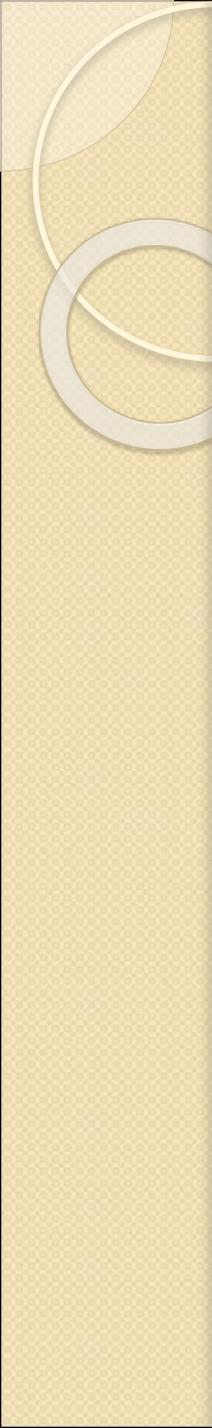
K⁺ Effects on Germination under Salt stress

NaCl	KNO ₃				
	0 ppm	500 ppm	1000 ppm	1500 ppm	2000 ppm
6000 ppm	27.7	93.3	95.5	77.7	77.7
0 ppm	96.6	96.6	96.0	82.2	82.2



Results

- **Results revealed that at 0 ppm KNO_3 , 27% of seeds were emerged under salt stress.**
- **Germination was enhanced significantly at both 1000 ppm KNO_3 concentrations to record 95.5%.**
- **It was clear that as the K level increased, the seed germination was enhanced.**



Conclusion

These results indicate that potassium can be used to alleviate salt-induced toxic limitations in tomato plants and improve survival under salt stress conditions.



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