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Sodium chloride effect on rye (*Secale cereale*)

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Abstract Sodium chloride has negative effects on rye seeds. In study were used seeds from two genotypes of rye (Ergo and Orizont). The germination was accomplished in sterile plastic recipients, on germination paper at a temperature of 21 ^{o} C. The sodium chloride concentrations 0,5, 1, 1,5 and 2 g/l were used for watering the seeds. After a week it was observed a significant decreasing of the germinating seeds in rapport with the control, at concentrations over 1g/l (V3, V4, V5). Between the two genotypes, after applying the treatment, it was noticed that Orizont had a greater sensitivity than Ergo.

Key words

Rye, sodium chloride, germination

During their life cycle, all plants were exposed to multiple stress factors. Each plant will have a different response, depending on species and the stress source.
From all environment stress factors, salinity is the most important factor which affects the human security. High concentrations of salt in the soil reduce crops from numerous plant species harvested in the entire world. Critically, the salinization problem grows, mostly because of the inappropriate agricultural practices. Irrigated lands are highly exposed to risks, approximately one third of these lands are significantly affected by salinity.
Salinity appoints the salt content of a solution, of water, or of a soil. It is expressed quantitatively as mass concentration and mass percentage, and its usually expressed in grams per liters (g/l) or in grams per mile (‰).
Salinity is one of the main factors which induces a significantly drop in crop yields, in many parts of the world, especially in arid and semiarid zones. A land where the soil is rich in soluble mineral salts but has a reduced fertility is called saltiness land.
In the case where is a concentration of salts in the soil, this will cause water and nutrients to be less available to plants.
The rye belongs to cereal group. Rye grows up better in cool and dry climate zones, adapting better than wheat in this climate .Rye wasn't harvested in antiquity, so it spreader in wheat fields from Asia Minor, and then in Europe. Germination is the first phase of the plants life cycle and determine where and when a crop can be settled.

Germination is the initial stage of a plant's life cycle and determines where and when a crop can be established. Plant available water is restricted in soils containing excess sodium chloride, resulting in partial dehydration of cell cytoplasm. Such plasmolysis affects the metabolism of cells and functions of macromolecules and, ultimately, results in cessation of growth.

Materials and Methods

The objectives of this research were knowledge and understanding the germination mechanisms under the sodium chloride influence on *Secale cereale* species.

Biological Materials used

Two types of commercial rye, Ergo and Orizont.

Research methods used

For the measurements to be made, the rye seeds were put in sterile plastic containers on filter paper. Variants experiments consisted in subjecting the plants under salt stress conditions for both variants as follows:
V_1 – H_2O
V_2 – 0,5 g/l NaCl
V_3 – 1 g/l NaCl
V_4 – 1.5 g/l NaCl
V_5 – 2 g/l NaCl

Results obtained

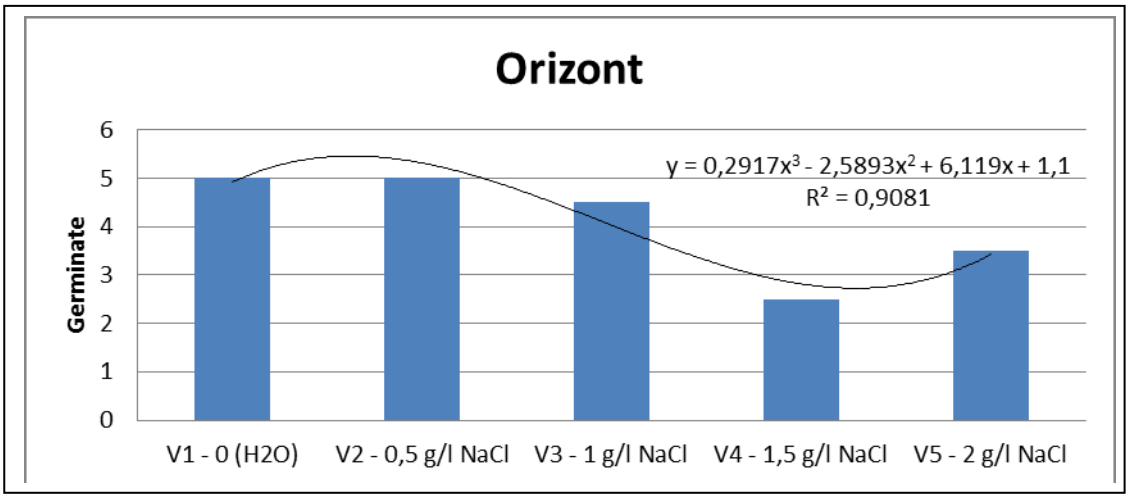

Fig. 1 Rye seed germination – Orizont under the influence of NaCl

In this graph it can be seen as V1, which contains H2o has a equal correlation to that of V2, which has a concentration of 0.5 grams of NaCl. One can see that the higher salt concentrations increase the number germination decreases, most severely affected by salt stress is V4 with a concentration of 1.5 g/l which has an average of 2.5 seeds germinated, compared to V1 and V2 that have a germination rate of 100 %.Regression curve is a polynomial of degree type III, with a good significance of the correlation coefficient calculate. In date if germinated seeds variety Horizon coefficients are positive maximum monomer which requires an increase in the range 0 to 0.5 with a peak around 2.84, i.e. a decrease in the range from 0.5 to 1.5 with a minimum around 0.13.

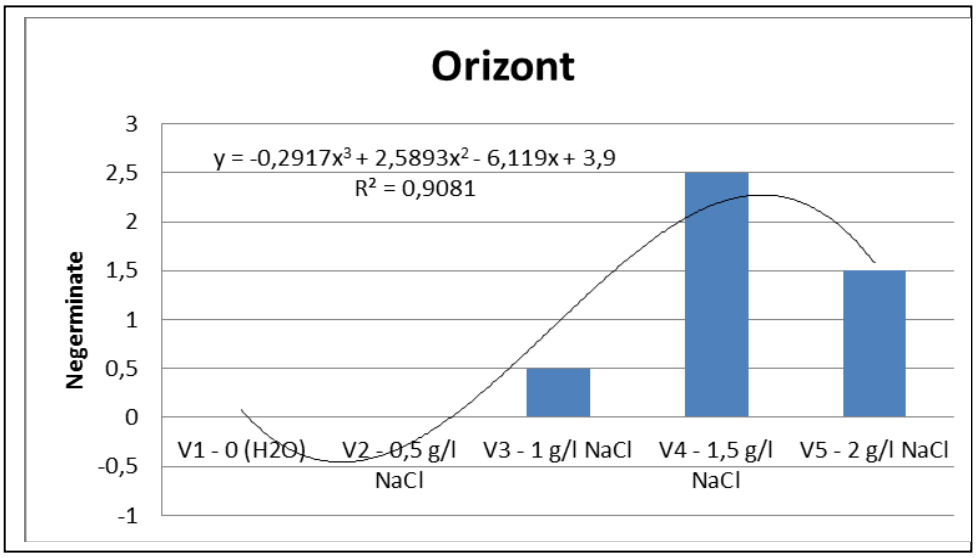

Fig. 2 Rye seeds that had not germinated – Orizont under the influence of NaCl

As written above, in this graph we can see the increasing number of seeds that had not germinated compared with the control. Again, we see that V4 is most affected by NaCl, followed by V5 and later by v3. Regression curve is a polynomial of degree type III, with a good meaning correlation coefficient on seeds do not germinate if the varieties calculate. In Horizon coefficients are negative maximum monomer which requires a decrease in the range from 0 to 0.5 with a minimum around 0.13, an increase in the range 0.5 to 1.5 with a maximum around 2.84.

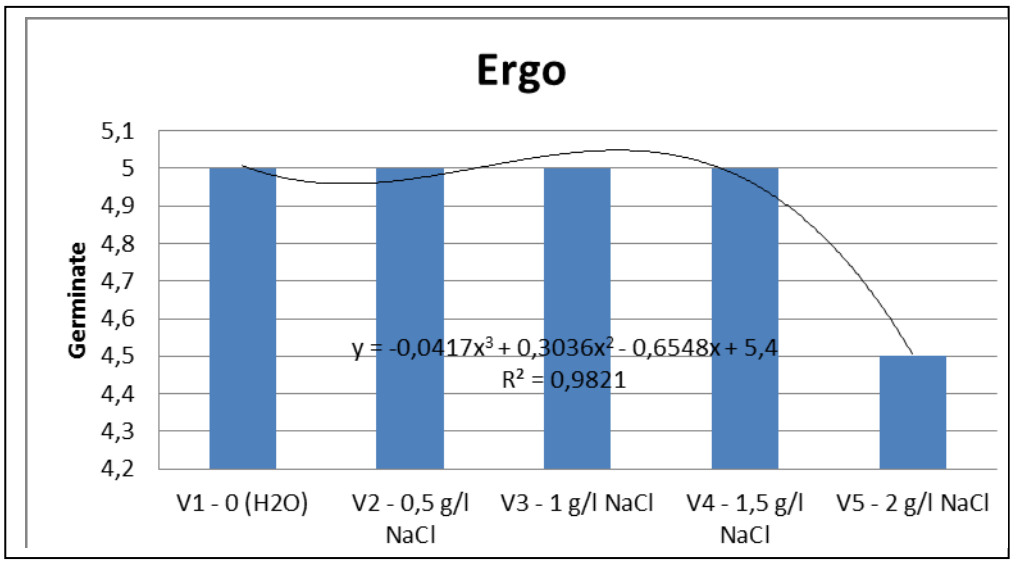

Fig. 3 Rye seed germination – Ergo under the influence of NaCl

Here we see that hybrid Ergo is more tolerant to salt stress compared to hybrid Orizont, first three variants, except the control, have a germination rate of 100 %, except V5 which has an average of germinated seed of 4.5. Regression curve is a polynomial of degree type III, with a good significance of the correlation coefficient calculate. In date if germinated seeds variety Ergo, the maximum coefficients are negative monomer which requires a decrease in the range from 0 to 0.5 with a minimum around 1.58 that an increase in the range 0.5 to 1.5 with a maximum around 3.41.

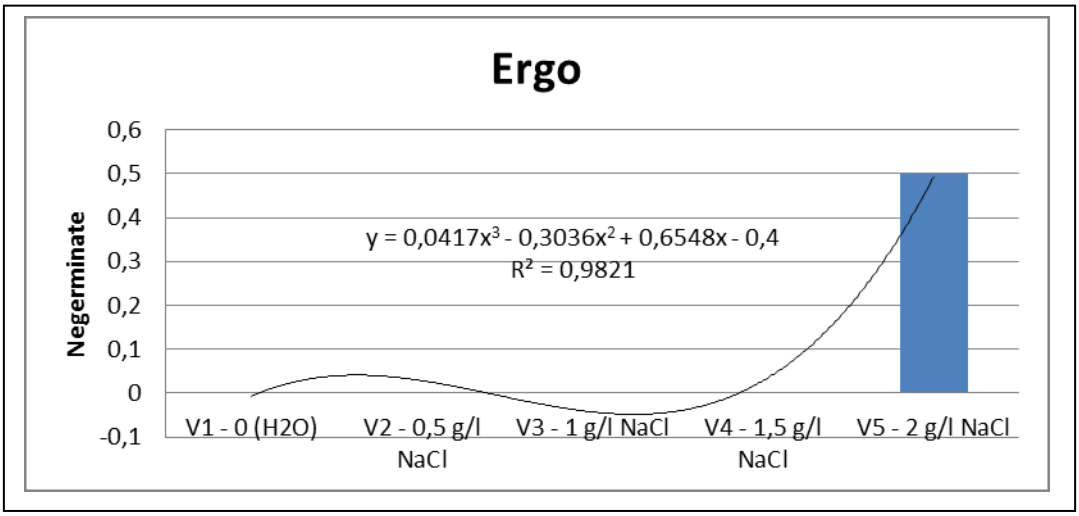

Fig. 4 Rye seeds that had not germinated – Ergo under the influence of NaCl

The seeds that had not germinated were in low numbers hence we conclude that the Ergo is more resistant to salt stress than Orizont. Regression curve is a polynomial of degree type III, with a good meaning correlation coefficient on seeds do not germinate if the varieties calculate. In Ergo, the maximum coefficients are positive monomer which requires an increase in the range 0 to 0.5 with a peak around 3.41 that a decrease in the range from 0.5 to 1.5 with a minimum around 1.58.

Conclusions

From the previous information we can conclude that hybrid Ergo (Fig 3, fig 4) is more resistant to salt stress than hybrid Orizont (Fig 1, fig 2).

Bibliography

1.Berhanu Abraha Tsegay and Berhane Gebreslassie, 2014 - The effect of salinity (NaCl) on germination and early seedling growth of Lathyrus sativus and Pisum sativum var. abyssinicum. African Journal of Plant Science,page 1 and 2.

2.El Midaoui Mohammed, Mohamed Benbella and Ahmed Talouizete, 2002, Effect of sodium chloride on sunflower (Helianthus annuuss L.) seed germination.

3.Popescu Ioana,.2011 - Reseasches regarding the physiological reaction of some tomato genotypes to saline stress

4.http://ro.wikipedia.org/wiki/Salinitate