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# Wheat Growth Parameters in Response to Irrigation Salinity in Wheat- *Triticum Aestivum L.*

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## ABSTRACT

Crops grown on salt-affected soils may experience physiological drought stress, ion toxicity, and mineral shortage, resulting in lower growth and output. Salinity is the most important abiotic factor limiting crop development and output globally. Improving agri-food production in salt-prone locations is critical for meeting rising food demand in the near future. A pot experiment was conducted to study the impact of saline irrigation water on the chemical properties of sandy loam soil and their influence on growth, yield, and other biometric parameters of wheat *(Triticum aestivum L.), Cv KRL 213 in* the farmer's field at Karnal. Three irrigation water treatments i.e., Tube well water (TW), saline water (SW1, $EC_{iw}$ 10.0 dS $m^{-1}$, SAR 5.0 $mmol^{1/2}$ $L^{-1/2}$), and concentrated saline water (SW2, $EC_{iw}$ 10.0 dS $m^{-1}$, SAR 5.0 $mmol^{1/2}L^{-1/2}$) were applied in reclaimed normal soil (pHs 7.5 and ECe 1.0 dS $m^{-1}$). The results showed that, when low-quality water was applied to normal soil, salt increased, increasing the likelihood of normal soil deterioration. Continuous irrigation with concentrated salt water (SW2) raised the ECe of the root zone soil, which had a negative impact on wheat crop mortality (approximately 70%). In post-wheat samples, soil organic carbon, calcium carbonate, and cation exchange capacity (CEC) remained constant across all water treatments. Concentrated salty water (SW2) is not advised on its own, but it can be used in conjunction with other management practices (by mixing with rain, pond, or canal water) to reduce the negative impacts on soil chemical characteristics and crop development.

## ❖ INTRODUCTION

- Wheat (*Triticum aestivum L.*) is a cereal crop that is widely farmed in many parts of the world .
- Wheat (*Triticum aestivum L.*) is the dominant cropping system in arid and semi-arid countries. This crop requires a lot of water to grow and yield well.
- Irrigation with indiscriminate and prolonged use of water containing dissolved salts causes soil salinity or sodicity, which has a negative impact on crop yield and eventually renders irrigated fields unsuitable for agriculture. The magnitude of the issue is determined by the kind and number of salts, the soil type, the plant species, its growth stage, and the amount of water going through the root zone.
- The global scarcity of fresh water supplies for agriculture is anticipated to increase the use of low-quality water for irrigation. Poor quality water is abundant in arid and semi-arid parts of the world, and irrigation with this water is sometimes the only choice for attaining significant increases in food production, posing a huge danger to the sustainability of natural resources and the environment.

## ❖ METHODOLOGY:

**Water Preparation of Various Quality**

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**Wheat (*Triticum aestivum L.)* cv. KRL 213 was cultivated as a test crop to investigate its performance under poor water quality irrigation.**

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**soil samples were gathered in order to determine the chemical qualities of regular soil.**

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**Extraction of soluble salts in saturation paste extract.**

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**Determination of carbonate and bicarbonate**

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**Determination of chloride**

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**Determination of calcium and magnesium by versenate method**

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**Determination of sodium and potassium**

## ❖ RESULTS:

- A pot experiment was conducted to study the impact of saline irrigation water on chemical properties of sandy loam soil and their influence on growth, yield and other biometric parameters of wheat *(Triticum aestivum L.), Cv KRL 213* in the farmer's field at Karnal. Three irrigation water treatments i.e., Tube well water (TW), saline water (SW1, $EC_{iw}$ 10.0 dS $m^{-1}$, SAR 5.0 $mmol^{1/2}$ $L^{-1/2}$) and concentrated saline water (SW2, $EC_{iw}$ 10.0 dS $m^{-1}$, SAR 5.0 $mmol^{1/2}L^{-1/2}$) were applied in reclaimed normal soil (pHs 7.5 and ECe 1.0 dS $m^{-1}$).

- Although ESP build-up was observed in all water treatments in the soil yet significant increase in ESP was not observed under SW2. It was further observed that ESP build-up was enriched further after the harvest of wheat (*Triticum aestivum* L.) crop. Cations and anions build-up were more pronounced in normal soil as compared to initial soil samples. As salt load under wheat (*Triticum aestivum* L.) soils increased as cation and anion build-up correspondingly increased under wheat (*Triticum aestivum* L.) crop. Wash out of soluble cations ($Na^+$, $Ca^{2+}$ and $Mg^{2+}$) and alkali ions ($CO_3^{2-}$ and $HCO_3^-$) was observed under TW treatment for saline soil in wheat (*Triticum aestivum* L.) soil samples in all soil depths. Contrary to this, normal soil was found richer in all cations like $Na^+$, $K^+$, $Ca^{2+}$ and $Mg^{2+}$ and anions like $CO_3^{2-}$, $HCO_3^-$, $Cl^-$ and $SO_4^{2-}$. A preferential $Na^+$ in addition to $Ca^{2+}$ and $Mg^{2+}$ holding in normal soil was noticed under SW1 and SW2.

## ❖ CONCLUSION

- When low-quality water was applied to normal soil, salt increased, increasing the likelihood of normal soil deterioration.
- Continuous irrigation with concentrated salt water (SW2) raised the ECe of the root zone soil, which had a negative impact on wheat crop mortality (approximately 70%). In post-wheat samples, soil organic carbon, calcium carbonate, and cation exchange capacity (CEC) remained constant across all water treatments.
- Concentrated salty water (SW2) is not advised on its own, but it can be used in conjunction with other management practises (by mixing with rain, pond, or canal water) to reduce the negative impacts on soil chemical characteristics and crop development.

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