

EFFECT OF GROUND WATER QUALITY ON SOIL SALINITY AND CHEMICAL COMPOSITION OF MUSTARD CROP OF GHARSANA TEHSIL, DISTRICT SRIGANGANAGAR, RAJASTHAN

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Abstract: The survey of ground water quality on soil salinity and chemical composition of mustard crop of Gharsana tehsil, district Sriganganagar, Rajasthan was undertaken to assess the quality of ground water and its effect on physico-chemical properties of soils and chemical composition of mustard. Forty ground irrigation water samples along with their corresponding forty surface (0-15 cm depths) soil and mustard plant samples were collected from different villages of Gharsana tehsil. The quality of irrigation water were analyzed for physico-chemical characteristics such as pH, EC_{iw} , SAR, RSC and potential salinity and it was found that majority of ground waters of the study area are not suitable for irrigation purposes. The effects of quality of irrigation water on the soil salinity were determined. The results showed that all irrigated fields have high salt concentration as indicated by pH_2 , EC_2 and SAR_2 values of soil samples. Saline water increased the soil salt. Thus, the salts accumulation in soil was closely related to the salt concentration of irrigation water, and there was a progressive and significant increase in soil salinity values as the potential salinity of irrigation water increases. Use of high EC_{iw} (8.60 dS/m), pH (9.69), SAR_{iw} (18.61), RSC_{iw} (12.30 me/L) and potential salinity (71.61 me/L) of ground water decreased the per cent K^+ and Mg^{+2} content in mustard plant leaves due to relative dominance of Na^+ ion resulting increased Na^+ and Ca^{+2} content.

Keywords: Ground water quality, Salinity, Correlation, Mustard

REFERENCES

- Ayres, R.S. and Westcot, D.W. (1985). Water Quality for Agriculture. Irrigation and Drainage Paper No. 29. Food and Agriculture Organization of the United Nations.
- Balki, A.S., and Padole, V.R. (1982). Effect of pre-soaking seed treatment with plant hormones on wheat under conditions of soil salinity. *Journal of Indian Society of Soil Science*, 30 : 361-365.
- Bhargava, B.S. and Raghupathi, H.B. (1993). In: Methods of analysis of soils, plants, waters and fertilizers. H.L.S. Tandon (Ed.) *F.D.C.O.*, New Delhi, : 41.
- Chauhan, R.P.S., Bhudayal and Chauhan, C.P.S. (1988). Ameliorating effect of rain on sodicwater irrigated soil. *Journal of the Indian Society of Soil Science*, 36: 590-592.
- Chhipa, B.R. and Lal, P. (1985). Effect of soil salinity on yield, yield attributes and nutrient uptake by different varieties of wheat. *Annals of Edaphology and Agrobiology* 44, : 1681-1691
- Cucci, G., Lacolla, G. and Rubino, P. (2013). Irrigation with saline-sodic water: effects on soil chemical-physical properties. *African Journal of Agricultural Research*, 8: 358-365.
- Doneen, L.D. (1963). Water quality for agriculture. Department of Irrigation, University of California, Davis p.48.
- Girdhar, I.K. and Yadav, J.S.P. (1989). Effect of different Mg/Ca ratios and electrolyte concentrations in irrigation water on the nutrient content of wheat crop. *Plant and Soil*, 65: 63-71.
- Gupta, I.C. (1979). Use of saline water in agriculture in arid and semi-arid zones of India. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, p.210.
- Holanda Filho, R.S.F. de Santos, D.B. dos Azevedo, C.A.V. de Coelho, E.F. and Lima, V.L.A. de (2011). Saline water on chemical properties of soil and nutritional status of cassava. [Portuguese sp.] *Revista Brasileira de Engenharia Agricola e Ambiental*, 15 :60-66.
- Jat, R.L. (1986). A study on the effect of levels of nitrogen, phosphorus and potassium and qualities of irrigation water on wheat grown on loamy sand soil. Ph.D. Thesis, Sukhadia University, Udaipur, (Raj.).
- Khandelwal, R.B. (1986). A study on the evaluation of water quality with respect to boron for wheat grown on different soils. Ph. D. Thesis, Sukhadia University, Udaipur (Raj.).
- Kuiper, M. (1997). Irrigation management strategies for improved salinity and sodicity control. Ph.D. Thesis, Dept. of Agri. Sciences, Wageningen Univ. Holland, 237p.
- Kumawat, G.L. (1989). Response of pearl millet (*Pennisetum typhoides* (Burm. f.) S&H) genotypes under supplemental irrigation with saline sodic waters and computation of salt tolerance index. M.Sc. (Ag) Thesis, Rajasthan Agricultural University, Bikaner.
- Lal, P., Mali, G.C. and Singh, K.S. (1980). A study on the effect of RSC of irrigation water on the

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properties of a loamy sand soil and on yield and nutrient uptake by wheat and barley. *Annals of Arid Zone*, 19 : 395-397.

Malik, D.M., Khan, M.A. and Ahmad, B. (1984). "Gypsum and fertilizer use efficiency of crops under different irrigation system in Punjab", Presented in Seminar on Optimising Crop Production Through Management of Soil Resources, Lahore, Pakistan, 27.

Mascellis, H.C.X.X.W.T.R., de Mele, G. and You Quan Gang Peng Fei Tedeschi, A. (2011). Effects of saline water irrigation on soil properties in northwest China. *Environmental Earth Sciences*, 63 : 701-708.

Oswal, N.M. (1999). Salinity, alkalinity and fertility indices of soils and quality of irrigation water of Sambhar Panchayat Samiti of Jaipur district (Rajasthan). M.Sc. (Ag) Thesis, Rajasthan Agricultural University, Bikaner.

Pathan, A.R.K. (1987). Evaluation of salinity and sodicity hazard of irrigation water for clusterbean (*Cymopsis tetragonoloba* L.) grown on different soils. M.Sc. (Ag) Thesis, Sukhadia University, Udaipur.

Ragab, A.A.M.M., Hallel, F.A. and Abd El-Hady, M. (2008). Irrigation water salinity effect on some soil water constants and plant. *Twelfth International Water Technology Conference, IWTC12 Alexandria, Egypt* pp.1

Ram, S. (2003). Determination of salinity and alkalinity indices of irrigated soils of Panchroli soil series of Rajasthan. M.Sc. (Ag) Thesis, Rajasthan Agricultural University, Bikaner.

Richards, L.A. (1954). *Diagnosis and Improvement of Saline and Alkali Soils. USDA Handbook. No. 60.* U.S. Government Printing Office, Washington, D.C.

Rowe, D.R. and Abdel-Magid, I.M. (1995). Handbook of Wastewater Reclamation and Reuse. CRC Press, Inc. p. 550.

Shainberg, I. and Letey, J. (1984). Response of soils to sodic and saline conditions. *Hilgardia* 52(2): 1-57,

Shamsi, K. and Kobraee, S. (2013). Biochemical and physiological responses of three wheat cultivars (*Triticum aestivum* L.) to salinity stress. *Annals of Biological Research*, 4: 180-185.

Sharma, S.C. (2005). Salinity and alkalinity indices of soils and quality of irrigation water of Parbatsar soil series of Rajasthan. M.Sc.(Ag.) Thesis. Rajasthan Agricultural University, Bikaner.

Singh, B. and Singh, D. (1997). Influence of residual sodium bicarbonate in saline water on yield, oil content and oil production of lemon grass. *Journal of the Indian Society of Soil Science*, 45 : 353-354.

Singh, R.B., Minhas, P.S., Chauhan, C.P.S. and Gupta, R.K. (1992). "Effect of high salinity and SAR waters on salinization, sodication and yields of pearl-millet and wheat", *Agric. Water Management*, 21: 93-105.

Somani L.L. (1982). Effect of bicarbonate rich irrigation waters on germination, nodulation and growth of pea (*Pisum sativum* L.) *Agronomia Lusit*, 41: 231-240.

UCCC (University of California Committee of Consultants). (1974). Guidelines for Interpretations of water Quality for Irrigation. Technical Bulletin, University of California Committee of Consultants, California, USA pp. 20-28.

Yousufinia, M., Ghasemian, A., safalian, O. and Asadi, A. (2013). The effect of NaCl on the growth and Na⁺ and K⁺ content of barley (*Hordeum vulgare* L.) cultivares. *Annals of Biological Research*, 4: 80-85.