

Performance of various nitrogenous carriers under salt stressed environment for wheat crop

VISHAL KHAJURIA* AND G. R. SINGH

Department of Agricultural Chemistry, C.C.R. (P.G.) College, Muzaffarnagar (U.P.)

(Accepted : October 2005)

SUMMARY

A pot experiment was conducted in greenhouse during the Rabi season of 2003-04 at the experimental farm of Ch. Chhotu Ram (P.G.) College, Muzaffarnagar in which various forms of N-carriers were tested for their suitability to wheat crop grown under salt stressed environment. Four forms of nitrogen were applied through urea, calcium ammonium nitrate, ammonium sulphate and ammonium nitrate. Ammonium sulphate was found best under saline conditions among the four N-carriers tested in this experiment. Nature of N-carriers showed significant effect on the performance of wheat crop.

Key words : Nitrogen, wheat, salt stress.

The agricultural prosperity of the country directly depends upon its irrigated land. The economic importance of salt problems in irrigated areas is though recognized but not adequately realized and understood and a number of such problems still remain unanswered. Various workers in the country and abroad have reported the higher salt content in well and tube-well waters than canals. Quality of irrigation water is an important consideration in appraisal of saline and alkaline conditions in an irrigated area. The irrigation with saline water markedly affects the soil properties, plant growth and nutrient composition of the plant due to excess of soluble salts around the root zone. Increased fertilization has some times been advocated to alleviate growth inhibition by salinity with some emphasis on phosphorus and potassium; but with major attention to nitrogen. In all major nutrients nitrogen is considered to be the most limiting nutrient; hence its application to the soil should find an important place. Various nitrogenous fertilizers are available in the market for use in general, but which one is the best in saline condition is still a suspicious problem of cultivators. Ammonium sulphate was found superior to urea, calcium ammonium nitrate and ammonium chloride (Nit ant and Dragon, 1974). On the other hand, urea was found better than ammonium sulphate by Misra and Singh (1968) and equivalent to sulphate by Pathak *et al.* (1975). Therefore, suitability of N-carriers under salt stressed environment needs further confirmation. Hence, the present investigation entitled "Performance of Various N-Carriers under Salt Stressed Environment" was conducted to recommend the best nitrogenous fertilizer for wheat crop grown under saline environment.

MATERIALS AND METHODS

A pot experiment was conducted at the experimental farm of the Ch. Chhotu Ram (P.G.) College, Muzaffarnagar for suggesting the best performance of N-carriers wherein,

*Author for correspondence

earthen pots of 22cm diameter were used for growing wheat plants. All the pots inside were lined with polythene and filled with 10 kg of experimental soil collected from 0-15 cm layer of experimental field. Saline waters were prepared by mixing salt solutions of CaCl₂, NaCl, MgCl₂, NaHCO₃ and Na₂SO₄ keeping the cationic ratio Na: Mg: Ca as 12: 5: 3 and anionic ratio Cl: SO₄: HCO₃ as 2: 1: 1 up to EC 8 dS/m and beyond that 6: 1: 1 up to EC 16 dS/m. Salinity levels were designated as S₁, S₂, S₃ and S₄ for EC 2.4 (control), 8, 12 and 16 dS/m, respectively. Recommended doses of P₂O₅ and K₂O (60 and 40 kg/ha) through SSP and KCl and four forms of nitrogen as ammonium sulphate (AS), urea, calcium ammonium nitrate (CAN) and ammonium nitrate (AN) @ 120 kg N/ha were given to the soil of the pots according to treatment combinations. Soil was well mixed after applying fertilizer. The treatments were replicated thrice in randomized block design. Pots were irrigated with treatment waters. When soil came in condition, it was again mixed well. Ten seeds of wheat variety HD-2329 were sown in Rabi season and on. After germination, five plants were maintained. Later on crop was irrigated with treatment waters whenever required. Having above-mentioned details, two sets of experiments were conducted. One set was used for taking plant samples at different growth stages for analysis and the other set was left for yield studies. The plant samples were procured at tillering and flowering and the straw and grain samples were collected at harvest for chemical analysis. Yield data were recorded after crop harvest. Soil samples were also collected for analysis. The uptake values of N, P and K at various growth stages and by grain and straw of wheat were calculated by using the content (%) of nutrient and its corresponding yield values.

RESULTS AND DISCUSSION

Salinity of irrigation water reduced significantly the grain and straw yield of wheat. The reductions were 27.27,