

EVALUATION OF COMMERCIAL SODIUM CHLORIDE AS EXTRACTANT OF AMMONIUM NITROGEN FROM SOIL

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ABSTRACT

Studies were undertaken to evaluate commercial sodium chloride (NaCl) as an extractant of exchangeable ammonium (NH_4) from soil with the objective of reducing the cost of N analyses. Ten soils differing in physico-chemical properties were used in the studies. One set of soils was enriched with NH_4 by adding ammonium sulphate @ 500 $\mu\text{g N g}^{-1}$ soil and allowing to stand for 2 hours. The soil was then leached and air dried before extraction. Locally available sodium chloride (table salt of National Foods) was compared with imported analytical grade potassium chloride (KCl) and NaCl obtained from Merck.

As compared to KCl, NaCl extracted relatively higher amounts of NH_4 from both untreated and NH_4 -enriched soils. However, the differences were non-significant and a highly significant correlation was obtained between $\text{NH}_4\text{-N}$ extracted by any two extractants. Locally-obtained commercial NaCl gave higher recoveries of mineral N as compared to that from Merck, but the differences were non-significant and the two data sets were significantly correlated. Strength of the extractant did affect the extractability of $\text{NH}_4\text{-N}$ but the differences were non-significant and a highly positive correlation was obtained for $\text{NH}_4\text{-N}$ extracted by either of the extractant at either normality. Storage of extracts did not significantly affect the $\text{NH}_4\text{-N}$ estimates.

INTRODUCTION

In soil, more than 90% of the nitrogen (N) exists in organic forms (Stevenson, 1985) which are slowly mineralized to mineral or inorganic forms viz., NH_4 , NO_3 and NO_2 . It is in these inorganic forms that plants make use of N from soil although small quantities of other nitrogenous compounds may also be taken up. The extraction and estimation of mineral N is, therefore, an important pre-requisite for quantification of N mineralization potential of a soil and availability of N to plants.

thereby giving overestimates of the mineral N. However, the quantity of non-exchangeable NH_4 is generally small (Kowalenko and Cameron, 1978; Nommik, 1981) and may not effect the mineral N estimates significantly.

Previously, we have reported that commercial sulfuric acid and sodium hydroxide could reliably be used for the determination of total N in soil and plant samples thereby decreasing the cost of analyses by 90% (Hussain et al., 1990). The objective of this investigation was to study the suitability of commercial sodium chloride (locally available table salt) as an extractant of $\text{NH}_4\text{-N}$ from soil and thus to further decrease the cost of N analyses since imported potassium chloride is used routinely in such analyses. Since NO_3 and NO_2 are extractable even with plain water, no attention was given to its extractability and determination. In this study we compared analytical reagent grade KCl (Merck), imported NaCl (Merck) and commercial table salt (National Foods brand).

MATERIALS AND METHODS

Soils

Surface (0-15 cm) soils representing ten agricultural soil series were collected during 1990, air-dried, sieved (2 mm) and analyzed for different physico-chemical properties using standard methods (Table 1).

Preparation of NH_4 -enriched soils

Portions (120 g) of each soil were saturated with 30 ml of ammonium sulphate solution to obtain N addition rate of 500 $\mu\text{g g}^{-1}$ soil. The soil-solution slurry was allowed to stand for 2 hours and then subjected to suction filtration using Buchner funnels. The residual soil was washed twice with 25-ml portions of distilled water and excess