

A MODIFIED CHEMICAL METHOD OF ASSESSING POTENTIALLY AVAILABLE NITROGEN IN SOIL

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ABSTRACT

A modified chemical laboratory method to assess the potentially available N in soil likely to be available during the growing season of crop has been proposed. Fresh or air dried soil samples were autoclaved in 0.01 M CaCl₂ solution at 121 °C for 16 hours. The samples were then filtered and analyzed for NH₄, NO₃ and NO₂-N by automated colorimetric method. The levels of NH₄-N in both air dried and fresh soils increased after autoclaving. There were also changes in the NO₃ and NO₂-N content of the soils. The inorganic N content of the fresh and air dried soils were correlated with total N, total C and total biomass C ($r = 0.72 - 0.74, 0.86 - 0.89$ and $0.79 - 0.81$, respectively). The correlation with clay was poor ($r = 0.21 - 0.28$) and was negative with soil pH ($r = 0.64 - 0.58$).

INTRODUCTION

The need for a satisfactory laboratory method of obtaining an estimate of the amount of N likely to be made available for crop growth by mineralization of soil organic matter during the growing season has long been evident and numerous biological and chemical methods have been proposed.

Nommik (1976) extracted soil with acid dichromate and then steam distilled with NaOH for the determination of NH₄-N. Sahrawat (1982) treated soil with hydrogen peroxide for the oxidation of organic matter and determined NH₄-N by steam distilling with MgO. Stanford and Smith (1976) autoclaved soil samples in 0.01 M CaCl₂ for 16 hours at 121 °C. The NH₄-N was determined by steam distillation with MgO or by the Conway microdiffusion method.

Gianello and Bremner (1986) developed two rapid methods of assessing potentially available organic N. One method involved determination of NH₄-N produced by steam distillation of the soil sample with pH 11.2 phosphate-borate buffer for eight minutes. The other involved determination of the NH₄-N produced by heating the soil sample with 2 M KCl in a stoppered tube at 100 °C for 4 hours. The chemical method that has received most attention is the procedure proposed by Stanford and Smith (1976)