Nitrogen Availability Indexes

J. M. BREMNER
Iowa State University
Ames, Iowa

88-1 INTRODUCTION

88-1.1 General

Practically all the nitrogen in surface soils is organically combined (see section 85-1). This organic soil nitrogen cannot be utilized directly by plants, but some of it (usually 1 to 3%) is mineralized by microbial processes during the growing season, and this provides a substantial amount of plant-available nitrogen (i.e., nitrogen in the form of ammonium or nitrate). Indeed, one of the major contributions of soil organic matter to soil fertility is that it supplies a considerable quantity of N for plant growth and acts as a natural storehouse for this important nutrient. However, recent work has shown that the amount of N made available by mineralization of soil organic matter during the growing season is rarely sufficient to meet the demand for this nutrient in current cropping practices. This has led to a widespread appreciation of the importance of nitrogen fertilization and of the need for a method that will provide a satisfactory index of the availability of soil-N and will permit reasonably accurate prediction of the amount of fertilizer-N required to produce a desired crop yield.

The practical value of a method providing an index of the availability of soil-N has long been appreciated, and many biological and chemical methods have been proposed. No comprehensive review of the extensive literature on this subject is available, but Harmsen and Van Schreven (1955) and Allison (1956) have discussed the merits and defects of most of the biological and chemical methods which have been employed. The methods discussed in their reviews, and other techniques which have been proposed, are outlined in Tables 88-1 and 88-2. The literature cited in these tables does not include some of the early publications concerning the methods described, but references to most of these publications can be found in the