SCIENCE DU SOL n° 1986/1 - pp. 83-84 - PLAISIR-FRANCE

NITROGEN 15 UTILIZATION IN SOIL SCIENCE APPLICATION TO THE STUDY OF NITROGEN EVOLUTION BETWEEN MINERAL AND ORGANIC FORMS IN CALCAREOUS SOIL

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(Science du Sol n° 1982-2)

In a calcareous soil, nitrogen transformations are considered according to addition of tracers in mineral or organic forms.

— The evolution of nitrate N applied to a calcareous soil has been followed with and without the addition of straw. It is well established that the use of ^{15}N allowed the comparison between the gross and net nitrification rates (fig. 1 and 3). The observed "priming effect" should be interpreted in terms of the modifications in the nitrification amounted to one third of the gross nitrification which went on even in periods of high immobilization conditions.

— ^{15}N-labelled rye-grass with a $\frac{C}{N}$ ratio of 16 was added at a rate of 1 % $(\frac{W}{W})$ to a calcareous soil kept for two years at a constant moisture content.

Regular measurements of total and nitrate N allowed to follow the mineralization of N in the rye-grass as well as its influence on the mineralization of soil N and to evaluate the N losses.

At the end of the experiment about 40 % of the N in the rys-grass was nitrified. An increase in the mineralization of soil N in the treated soil was observed when compared to the control with no rye-grass added (fig. 5). The recovery of the added ^{15}N was complete, and no denitification loss was observed in spite of large amounts of nitrate N (200 ppm).

In a second stage the residual soil was either given an application of glucose or cropped to rye-grass in a pot experiment.

After a 3-week incubation period most of the nitrate N was incorporated into the nondistillable, acid-soluble N fractinon (amino-acids) and ^{15}N losses amounted to about 10 %.

The pot experiment showed higher dry matter yield and total N recovery values in the pots with added rye-grass to the soil as compared to the control pots. Losses amounted to about 25 % of the initial ^{15}N values. This last result stresses the role of the crop in the denitrification process.

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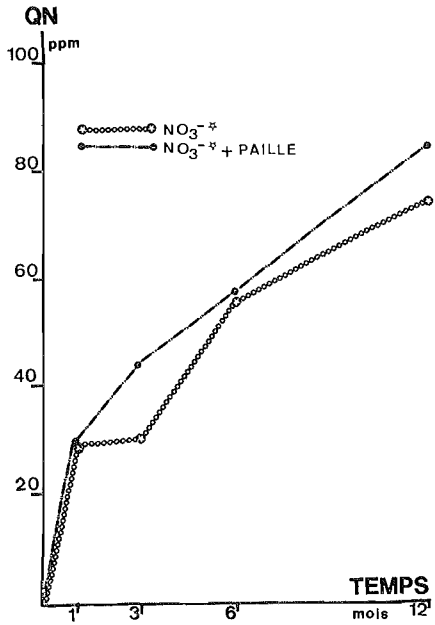

Figure 1 : Net mineralization

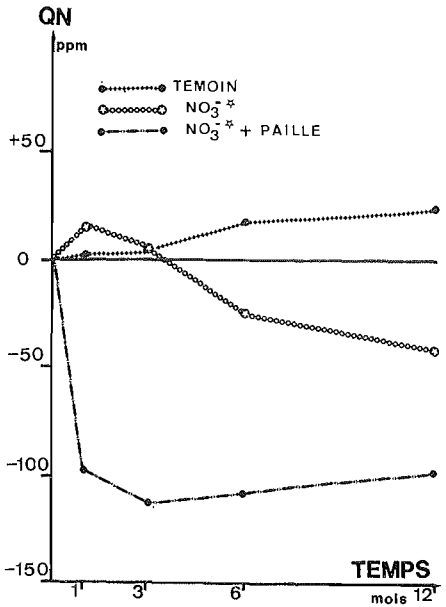

Figure 3 : Real gross mineralization

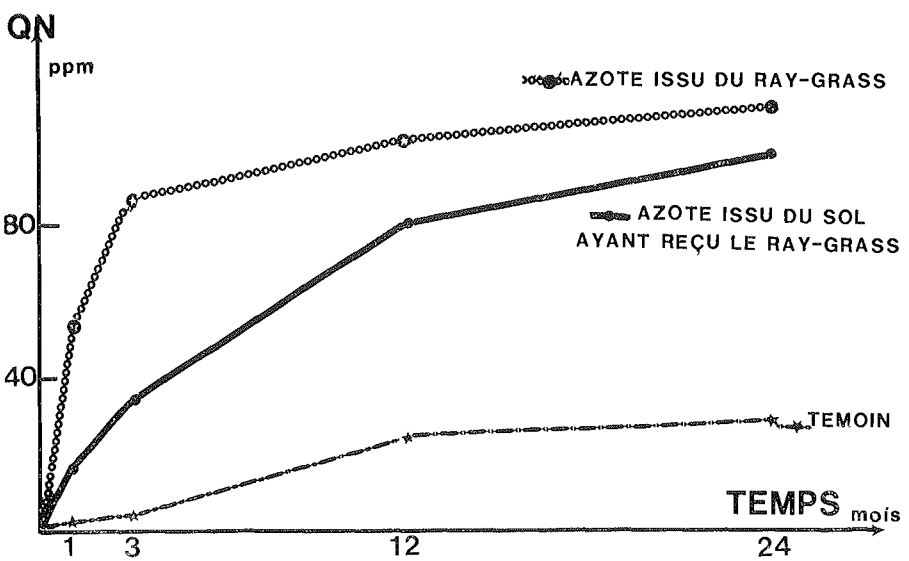

Figure 5 : Nitrification of soil and rye-grass nitrogen