Mineral nitrogen distribution in a paddy soil profile

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Monthly recordings of NH_4^+-N and NO_3^--N were made in soil profiles of four commercial fields during the rice growing season.

Soil samples were collected at the end of Mar 1981 and at monthly intervals from May through Sep at 0-15, 15-30, 30-45, and 45-60 cm depths.

Rice fields, continuously flooded until Aug, were located near Mortara (Pavia, Italy) in the middle of a region where, during 1979, rice production totaled 288,500 t on 54,381 ha.

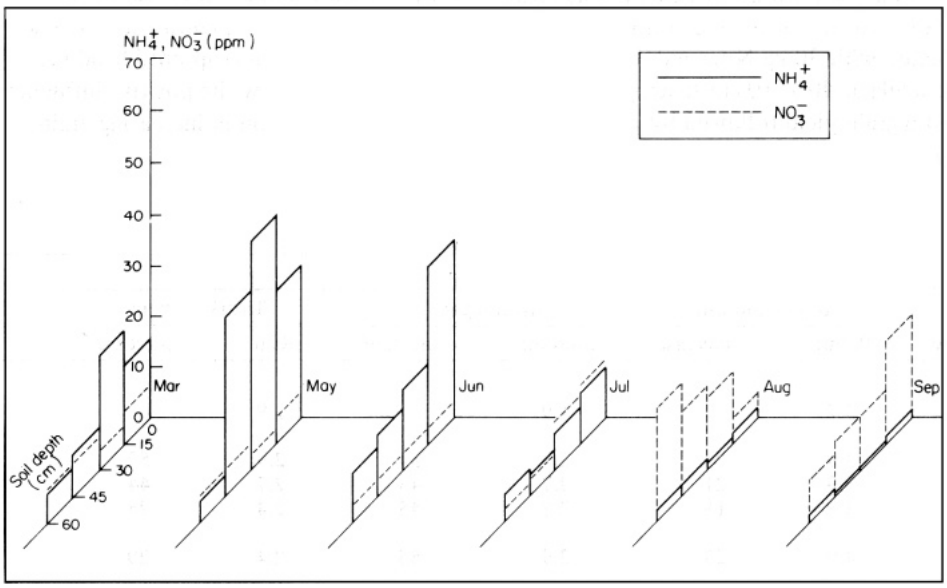
Fields had different soil characteristics, fertilization rates, and management (see table), but they showed a homogeneous rate of mineral nitrogen use. Commercial fields are usually fertilized before flooding and about 1 month after flooding. Fertilizers are scattered on the soil surface.

Ammonium was the dominant form of inorganic nitrogen in the soil during the first half of the rice growing season. Levels were higher on the surface and lower at the 45-60 cm depth (see figure).

Soil analysis and dates and kind of cultural practices, Mortara, Italy.

Field	Soil pH	% sand	% silt	% clay	Cation exchange capacity (meq/100 g)	Organic matter (%)	Flooding date	Seeding date	Basal application[a] (kg/ha)	Topdressing (kg/ha) and date
Giarre I	4.4	87.6	7.6	5.2	11.9	2.06	1 May 81	4 Apr 81	150 K 90 P 70 N	30 N 5 Jun 81
Giarre II	5.7	78.1	12.3	6.7	13.4	2.2	17 Apr 81	21 Apr 81	60 K 40 P 50 N	20 N 18 May 81
Mede	5.8	63.0	21.4	15.4	18.7	2.4	29 Mar 81	13 Apr 81	40 K 46 P 49 N	15 K 15 P 70 N 2 May 81
Campalestro	5.4	77.5	13.7	8.8	17.4	1.8	13 Apr 81	21 Apr 81	130 K 50 P 50 N	70 N 2 May 81

[a]For nitrogen fertilization, the following compounds in granular form were used: urea in Giarre I, $CaCN_2$ and $(NH_4)_2SO_4$ in Giarre II and Campalestro, $CaCN_2$, $(NH_4)_2SO_4$, and urea in Mede.



Ammonium and nitrate content in a paddy soil profile during rice culture at Mortara, Italy.

After June, NH_4^+–N decreased and NO_3^--N increased, perhaps because of NH_4^+-N oxidation in the surface aerobic layer.

During Aug and Sep very low levels of NH_4^+-N were detected in the soil and nitrate content increased. This was related to field drainage, and the consequent increase in soil oxygen content which encouraged NH^+_4-N oxidation to NO_3^--N.

During Aug, NO_3^--N accumulated in lower soil depths and in Sep higher NO_3^--N content was found in the surface layer, which indicates a possible nitrate reduction in the soil depth. Moreover, relative NO_3^--N abundance in the surface layer at the end of the rice growing season could have led to nitrate leaching during autumn rainfall. □

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