# Relative contribution of nitrogen sources to irrigated rice under contrasting rotations, soil types and N inputs

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In Uruguay rice rotates with perennial pastures and country productivity has reached 8 Mg $ha^{-1}$ with relatively low N fertilization inputs (70 kg N $ha^{-1}$). Our objective was to determine the relative contribution of different N sources (soil, fertilizer, biological fixation) in rice seeded in contrasting soil types, rotations systems and N fertilization rates. Twelve rice trials were located in three soils types and two contrasting rice predecessor (legume vs. no-legume pastures) during two growing seasons. Each experiment evaluated two N rates (0 kg $ha^{-1}$ and 64 kg $ha^{-1}$) split at planting, tillering and panicle initiation in a complete randomized block design with four replications. Determinations included $\delta^{15}N$, total N, organic C and $\delta^{13}C$ in soils and plants, rice biomass and yield. High variability in $\delta^{15}N$ was observed among soils; the value was correlated with soil sand content, r=0.90 and 0.71 in year one and two, respectively. In the first season, rice yield was correlated with soil N mineralization potential (r= 0.85) and productivity with N addition was 8% higher than without N (9.81 Mg $ha^{-1}$). In the second season, rice yield with N was 15% higher than without N (7.86 Mg $ha^{-1}$). Plant $\delta^{15}N$ suggested that N biological contribution from pastures or during the rice growing cycle was not significant to crop nutrition. Grain and plant $\delta^{15}N$ in all trials were very similar to soil $\delta^{15}N$ and no major differences in grain $\delta^{15}N$ and plant $\delta^{15}N$ was observed between N treatments, indicating that fertilizer contribution to grain N was very poor. Results suggested that soil is a major source of N in Uruguayan rice systems and that that isotopic fractionating process were not important, probably due to high crop demand of mineralizated N from soil.

**Keywords:** $^{15}N$ natural abundance, isotopic techniques, N cycle, flooded soils.