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ISOTOPIC CONCENTRATION OF C AND N IN DIFFERENT SPECIES ESTABLISHED IN FLUVIC NEOSOL IN THE MUNICIPALITY OF TUPARETAMA, SEMI-ARID PERNAMBUCO

Edilândia Farias Dantas*¹, Jéssica Rafaella de Sousa Oliveira², Regina Maria Barretto Campello Sampaio¹, Andressa Silva de Oliveira¹, Everardo Valadares de Sá Barretto Sampaio¹, Ana Dolores Santiago de Freitas²
¹Universidade Federal de Pernambuco, Recife/Pernambuco, Brasil; ²Universidade Federal Rural de Pernambuco, Recife/Pernambuco, Brasil. * edilandiadantas@hotmail.com

The dynamics of nitrogen can be better understood using techniques based on the natural abundance of ¹⁵N in environmental samples, related to the soil-plant-atmosphere system. The objective of this study was to determine the isotopic signatures of different tree species present in a caatinga area in Tuparetama - PE. Samples were collected from five individuals of naturally occurring tree species in the studied plots, including both native and exotic species. These species were divided into those without reported capacity for association with diazotrophic bacteria—Baraúna (*Schinopsis brasiliensis*), Pereiro (*Aspidosperma pyrifolium*), Juazeiro (*Ziziphus joazeiro*)—and a nodulating leguminous species, Algaroba (*Prosopis juliflora*). Healthy leaves were collected from each individual, dried in an oven at 65°C, and ground. Subsamples were placed in capsules and inserted into a ThermoQuest-Finnigan Delta Plus mass spectrometer (Finnigan-MAT; CA, USA) interfaced with an Elemental Analyzer (Carlo Erba model 1110; Milan, Italy) at the Laboratory of Isotope Ecology (CENA-USP, Brazil) to obtain total concentrations (%) and isotopic ratios of N and C. The isotopic ratios were determined in relation to recognized international standards. Reference materials (atropine, yeast extract, and soil standard no. 502 – 308, LECO Corporation) were included in all analytical runs. The natural abundances of ¹⁵N and ¹³C were expressed in δ (‰) units, representing the deviation from the standard of the ratios between the masses of ¹⁵N:¹⁴N and ¹³C:¹²C, following the equation: $\delta = (R_{\text{sample}}/R_{\text{standard}} - 1) \times 1000$ (R_{sample} and R_{standard} are the ¹⁵N:¹⁴N and ¹³C:¹²C ratios of the sample and the standard, with atmospheric N₂ as the N standard and Pee Dee Belemnite as the C standard). As all collected species have a C3 photosynthetic mechanism, they were depleted in δ¹³C, with average values ranging between -26‰ and -30‰, with no significant difference between the studied species. Due to its ability to absorb atmospheric N through symbiosis with diazotrophic bacteria, Algaroba showed a δ¹⁵N of 1.48‰, significantly lower than Baraúna (9.94‰), Pereiro (9.64‰), and Juazeiro (8.63‰). These results demonstrate that Algaroba, despite being an exotic legume, is capable of establishing symbiosis with naturally occurring soil bacteria, representing a potential input of N from the atmosphere to the soil-plant-atmosphere system.

Keywords: biological N fixation, natural nodulation, Caatinga, biogeochemical cycles

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