

Assessing the Nutritional Characteristics and Habitat Modeling of the Comorian's Yam (*Dioscorea comorensis*) in a Fragmented Landscape

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Abstract : High levels of habitat fragmentation and loss are the main drivers of plant species extinction. They reduce the habitat quality, which is a determining factor for the reproduction of plant species, and generate strong selective pressures for habitat selection, with impacts on the reproduction and survival of individuals. The Comorian's yam (*Dioscorea comorensis*) is one of the most threatened plant species of the Comoros archipelago. The species faces one of the highest rates of habitat loss worldwide (9.3 % per year) and is classified as Endangered in the IUCN red list. Despite the nutritional potential of this tuber, the Comorian's yam cultivation remains neglected by local populations due probably to lack of knowledge on its nutritional importance and the factors driving its spatial distribution and development. In this study, we assessed the nutritional characteristics of *Dioscorea comorensis* and the drivers of spatial distribution and abundance to propose conservation measures and improve crop yields. To determine the nutritional characteristics, the Kjeldahl method, the Soxhlet method, and Atwater's specific calorific coefficients methods were applied for analyzing proteins, lipids, and caloric energy respectively. In addition, atomic absorption spectrometry was used to measure mineral particles. By combining species occurrences with ecological (habitat types), climatic (temperature, rainfall, etc.), and physicochemical (soil types and quality) variables, we assessed habitat suitability and spatial distribution of the species and the factors explaining the origin, persistence, distribution and competitive capacity of a species using a Species Distribution Modeling (SDM) method. The results showed that the species contains 83.37% carbohydrates, 6.37% protein, and 0.45% lipids. In 100 grams, the quantities of Calcium, Sodium, Zinc, Iron, Copper, Potassium, Phosphorus, Magnesium, and Manganese are respectively 422.70, 599.41, 223.11, 252.32, 332.20, 780.41, 444.17, 287.71 and 220.73 mg. Its PRAL index is negative (- 9.80 mEq/100 g), and its Ca/P (0.95) and Na/K (0.77) ratios are less than 1. This species provides an energy value of 357.46 Kcal per 100 g, thanks to its carbohydrates and minerals and is distinguished from others by its high protein content, offering benefits for cardiovascular health. According to our SDM, the species has a very limited distribution, restricted to forests with higher biomass, humidity, and clay. Our findings highlight how distribution patterns are related to ecological and environmental factors. They also emphasize how the Comoros yam is beneficial in terms of nutritional quality. Our results represent a basic knowledge that will help scientists and decision-makers to develop conservation strategies and to improve crop yields.

Keywords : *Dioscorea comorensis*, nutritional characteristics, species distribution modeling, conservation strategies, crop yields improvement

Conference Title : ICBESE 2024 : International Conference on Biological, Ecological and Environmental Sciences, and Engineering

Conference Location : Paris, France

Conference Dates : November 18-19, 2024