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Kinetic of nutrient uptake and their utilization efficiency in a seratonious plant-*Blepharis sindica*

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Efficiency of plant nutrient uptake and use span multiple levels of biological organization from leaves to ecosystems are significantly affected with both spatial and temporal events. Plant communities on nutrient-poor soils are thought to use nutrients more efficiently to produce biomass than plant communities on nutrient rich soils. Yet, increased efficiency with declining soil nutrients has not been demonstrated empirically in semi arid areas where nutrient uptake and their utilization efficiency thought to be strongly affected with soil nutrient conditions with various pulse, inter-pulse and non-pulse events. In present investigation net nutrient uptake (P, Na, K, Ca and Fe) by a desert lignified seratonious plant *Blepharis sindica* and its nutrient utilization efficiency (NUE) were assessed spatially and with specific seasonal events. ANOVA analysis revealed that all the factors undertaken in the present investigation (i.e. site, seasonal event and the interaction between them) affects P, Na, K, and Ca nutrient uptake (J) and their nutrient utilization efficiency ($P<0.001$), however, for iron, interaction between site and event were recorded non-significant. Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity proves the usefulness of factorial analysis used in this study. Path analysis with community parameters revealed that this plant seems to be a better nutrient efficient only when it plays a key stone species role in a community. Further its relative importance value below 40 seems to be a threshold for net uptake of calcium. Uni-model (hump back) relationships if net uptake of P and Ca and NUE of P and Na with soil organic carbon were established. 80-90 mg $100g^{1}$ soil organic carbon largely supports the net uptake of phosphorus and calcium and nutrient utilization efficiency of phosphorus and sodium. On the other hand higher organic carbon (150-165 mg $100g^{1}$) played an inhibitory factor for them. Soluble and insoluble sugars showed monotonic positive relationships with and net uptake of calcium and iron.

Key words : Net uptake of nutrient**,** Nutrient utilization efficiency, Spatial and temporal events, Principal component analysis, Path analysis

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INTRODUCTION

The ion influx concerned with the relationship between the demands of the growing plant and the uptake of ion by its root, and with the process involved within the plants. Nutrient uptake depends on nutrient supply to the root surface and active absorption by root cells (Claasen and Steingraobe, 2002). It is influenced by various factors associated with (a) the edaphic factors such as nutrient concentration in soil solution, soil water content, soil temperature, soil compaction, mycorrhizal symbiosis (Chapin, 1980; Engels, 1993; Arvidsson, 1999; Lehmann, 2003) soil pH (Godbold *et al.*, 2003), access to water (Bouillet *et al.*, 2002), and water logging (Santiagon, 2000). (b) The spatial or site factors includes stand age (Bouillet *et al.*, 2002), and species composition (Davis *et al.*, 2004, Silva and Rego, 2003). (c) The temporal factors also influenced nutrient uptake and their utilization mechanisms, in the tropic, changes of climatic conditions during the year are less pronounced than in other region and are usually characterized by dry and rainy seasons (Soethe *et al.*, 2006). Here, seasonal changes in soil water content may affect nutrient uptake activity of root (Lehmann 2003; Ray and Singh, 1995).

The term nutrient use efficiency widely used as a measure of the capacity of a plant to acquire and utilize nutrients for production of timber, crops or forages. Definition of nutrient efficiency varies greatly (Gourley *et al.,* 1994). With regards to yield parameters, nutrient efficiency has been defined as the ability to produce a high plant yield in a soil or other media that would otherwise limit the production of a standard line (Graham, 1984 and Gourley *et al.*, 1994). Alternatively, nutrient utilization efficiency is generally defined as total plant biomass produced per unit nutrient absorbed, which is equivalent to the reciprocal of nutrient concentration in entire plant (Baliger *et al.,* 1990). Overall nutrient use efficiency in plants is