

Abundance and Distribution of Sedges in Relation to Soil Properties in Sedge-Dominated Habitats in Uyo Metropolis, South-South Nigeria

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Abstract

A field research was conducted to assess soil nutrient variation and plant distribution in four sedge-dominated habitats. Systematic sampling method was used. The result of the study revealed that a total of 12 plant species of which 3 were members of the family Cyperaceae were identified in the habitats studied. The Cyperaceae members found were of the genus: *Cyperus*. Other associated species found were *Sida acuta*, *Scoparia dulcis*, *Chromolaena odorata*, *Eleusine indica*, *Ludwigia decurrens* etc. The highest density values obtained in this study is characteristic of *Cyperus iria* in Habitat D (9500 st/ha) while the least density value is characteristic of *Plastostoma africanum* in Habitat 2 (200 st/ha). Multivariate correlation analysis evidenced that these differences in density of the sedges reflected the functions of variations important soil properties such as pH, exchangeable Ca, soil moisture, total nitrogen and available phosphorus.

Most specifically, the current result concludes that while *Cyperus iria* showed strong affinity for soil acid soils rich in available phosphorus which had moderate soil moisture regimes, *Cyperus haspan* indicated its preference for alkaline soils. This result lends knowledge and practical application in environmental management, weed science and habitat ecology.

Keywords: Sedges; Cyperaceae; correlation; Density; Habitat

1. Introduction

Pedology is the study of soil properties. Scientific

Uyo is geographically bounded on the East by Uruan Local Government Area, Abak Local Government Area in the West, Ibiono Ibom Local Government Area in the North and Ibesikpo Asutan Local Government Area by the South. The specific coordinates for sedge habitats are shown in Table 1.

Vegetation and soil sampling

Species were sampled in 10 m × 10 m quadrats, spaced at regular intervals of 20 m according to the methods of Knight, [3]. In each quadrat, plants were enumerated and species were properly identified to the species level.

Voucher specimens of unknown species were collected for proper identification at the Botany and Ecological Studies Departmental Herbarium, University of Uyo, Akwa Ibom State.

Frequency of occurrence and density of the plant species encountered were estimated according to the methods of Ubom, [4].

Also within each quadrat, Two soil samples were obtained at the depths of 0- 15 cm respectively which was later bulked to form a composite sample according to Mbong and Ogbemudia, [5].

The soil samples were air-dried and preserved for laboratory analysis. Soil pH was determined using Hanna hand held pH meter:

Available phosphorus was determined using Bray No. 1 method while Exchangeable Ca was determined using Flame photometry [6] Organic matter was determined using the Walkley-Black method [7].

Statistical analysis

Mean and standard error were computed from three replicates of soil physico-chemical properties. Analysis of variance (ANOVA) and Fisher least significant different (LSD) test were employed to ascertain significant differences between the means of the physicochemical properties of the studied soils.

Pearson's correlation computed through SPSS was employed to ascertain the strength of relationships existing between soil properties and density of sedges according to the methods of Ubom [8].

Results

The distribution of sedges and associated species found in the study area is shown in Table 2. The table records a total of 12 plants unevenly distributed in four habitats.

Habitat A recorded up to 5 species of which 1 is a sedge, Habitat B has one sedge and one associated species, Habitat C has three species of which only includes one sedge and then Habitat D which has 8 species (out of which 3 sedges were present).

The highest density obtained in this study was characteristic of Habitat D (9500 stands ha⁻¹ obtained for *Cyperus iria*) while the least density was the characteristic of Habitat 2 (200 stands ha⁻¹ recorded for *Plastostoma africanum*).

Table 3 shows the means of the physicochemical properties of the sedge dominated habitats. The habitats were weakly acidic with a pH ranging between 4.95 ± 0.14 up to 6.62 ± 0.095 in the four habitats. Organic matter content of the habitat sediments ranged between 2.95 ± 0.15 in habitat D, 2.87 ± 0.01 in habitat B, 2.54 ± 0.06 in habitat A and 2.52 ± 0.20 in habitat C.

Habitat/Species	Family	Density(stha-1)
Habitat A		
<i>Mitrocarpus villosus</i>	Rubiaceae	600
<i>Chromolaena odorata</i>	Asteraceae	400
<i>Sida acuta</i>	Malvaceae	400
<i>Centrosema pubescens</i>	Leguminosae	300
<i>Cyperus haspan</i>	Cyperaceae	2500
Habitat B		
<i>Cyperushaspan</i>	Cyperaceae	4000
<i>Scoparia dulcis</i>	Scoparaceae	800
<i>Cyperus iria</i>	Cyperaceae	3000
<i>Plastostoma sp.</i>	Rubiaceae	200
Habitat C		
<i>Cyperus iria</i>	Cyperaceae	2100
<i>Bidens pilosa</i>	Asteraceae	400
<i>Sida acuta</i>	Malvaceae	400
Habitat D		
<i>Cyperusiria</i>	Cyperaceae	9500
<i>Cyperusdifformis</i>	Cyperaceae	3000
<i>Scoparia dulcis</i>	Scoparaceae	1500
<i>Cyperusrotundus</i>	Cyperaceae	4000
<i>Mitrocarpus villosus</i>	Rubiaceae	1700
<i>Ludwigia decurens</i>	Onagraceae	3000
<i>Sida acuta</i>	Malvaceae	900
<i>Eleusine indica</i>	Gramineae	400

Conclusion

This research concluded that, the study area is endowed with a total of 13 plant species of which 4 were members of the family Cyperaceae. The Cyperaceae members mostly found were mostly of the genera: *Cyperus*. Other associated species found were *Sida acuta*.