



IS *NEPHROLEPIS FALICIFORMIS* J. SM. EVOLVING TO BIPINNATE FORM?

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ABSTRACT

Nephrolepis faliciformis J. Sm. is a very rare species found in tropical and humid regions of India. During many botanical explorations and from the cultivated plants in the St. Andrew's College botanical garden *N. faliciformis* was found to be highly unstable in morphology. It was observed that this plant was evolving into a bipinnate form from simple pinnate form. This condition of instability in morphology exhibiting high degree of variations is discussed.

KEY WORDS: *Nephrolepis faliciformis*, bipinnate, morphology, variations.



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INTRODUCTION

Pteridophytes are a group of plants also known as Ferns. They are the vascular plants which reproduce by the means of spores. There are about 12000 different species of Pteridophytes present in the world. In India about 1200 species are present⁷. The ferns are found to be abundant in the Himalayas and Western Ghats, which are the two hotspots of biodiversity in India. In Uttar Pradesh, ferns are supposed to be rich in diversity in the eastern parts near Nepal. About 135 species of ferns are reported endemic to India^{2,3}. The genus *Nephrolepis* also known as "Sword Fern" belongs to the family Oleandraceae. It is a very rare fern distributed in Eastern and Western Ghats and Assam. *Nephrolepis* is having 30 species in either terrestrial or epiphytic form distributed in tropical to subtropical regions around the world.

In India about 8 species have been listed by Dixit⁴. However their nomenclature, identity and distribution are still to be confirmed⁶. Hovenkamp and Miyamoto⁵ have done a detailed work on morphology, similarly Patil and Dongare⁸ have also contributed. The geographical limits of the study area - Ramgarh Forest of Gorakhpur are 26° 5' and 27° 29' north latitude and 84° 4' and 84° 26' east longitude. Due to change in the course of river Ghaghra and Rapti there has been a continuous change in its area. The district has an almost uniform height of 94-96m above sea level. A remarkable feature of its land scale is the total absence of marked topography. The forests of Gorakhpur division mainly comprises of 'Sal' trees. Almost all these forests are surrounded by cultivation, except those which are well connected to the reserved forests and the forests in the extreme north.

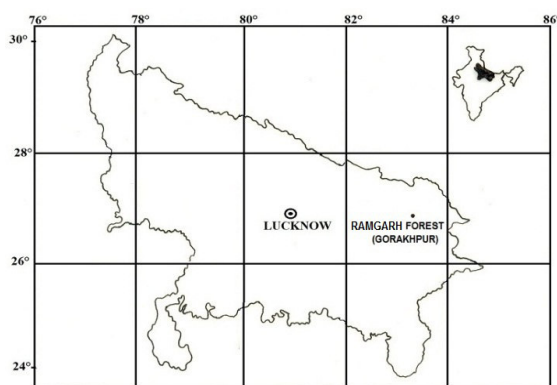


Figure 1
MAP OF STUDY AREA

MATERIALS AND METHODS

Collected plant species were processed properly, poisoned and mounted on herbarium sheets. For cytological studies young sori of plant was fixed in the field in a mixture of absolute ethanol, chloroform and glacial acetic acid (6:3:1). For chromosome counting the standard acetocarmine squash technique of Manton (1950) was followed. The herbarium is deposited in the Department of Botany, St. Andrew's College, Gorakhpur for future reference. Morphological, ecological and cytological observations were made.

SPECIMENS EXAMINED

Nephrolepis faliciformis – Gorakhpur-07.03.2012, 90 m, SACH 439, SACH 440. Gorakhpur- 11.08.2013, 90 m, SACH 599. Gorakhpur- 10.11.2013, 90 m, SACH 632

DESCRIPTION

Plant species of *Nephrolepis faliciformis* were collected from different localities in Gorakhpur during 2012-2014 at the altitudinal range 90-100 m. Rhizome of this species is dark brown in colour, scaly; fronds pendulous, thin, herbaceous, both surfaces glabrous; stipe 10-

25 cm, with sparse, ovate scales; lamina broadly lanceolate, 60-120 × 9-11 cm, unipinnate; basal pinnae distant, small, elliptic, 1.5-2.8 × 1-1.5 cm, base truncate, 5-6 × 1.5-1.8 cm, base truncate and slightly auriculate, apex acuminate. Sori orbicular, submarginal; indusia brown, reniform.

ECOLOGY

Found at the elevation of 50-800 m, also in shade and open places, terrestrial or epiphytic.

RESULTS AND DISCUSSION

Most Pteridophytes are highly sensitive even to the slight environmental modifications and most of them recess in undisturbed inaccessible humid forest shade under tree canopies. Extinction of plant and animal species is a natural phenomenon as part of the evolutionary process. Extinctions in plant kingdom is generally due to failure to produce variable adaptations with changing environment⁷. The present collection of *N. faliciformis* with partly

bipinnate pinnae is not an uncommon factor in Pteridophytes. Morphological variations occur due to changing environment. In the present study the plants collected during botanical exploration were planted in the St. Andrew's College, botanical garden in 2012. They have been frequently found to exhibit partly bipinnate forms of pinnae. The occurrence of this unusual form was found to be frequent. Many plants from the same rhizome stock or different rhizome stocks exhibited this unstableness. In the present study *N. faliciformis* has been found to be a tetraploid (n=82) plant (Fig.6 & 7). The spores and the sporangia were found to be normal (Fig.8 & 9). Wagner & Wagner, Abraham, Manickam and Rajkumar are of the view that high chromosome numbers have a high survival rate and they tend to adapt morphologically to the local environment rather than the low numbered species which slowly die out^{1,7,9}. The present case of instability in morphology can be attributed to polyploidy nature of the species.

PLATE-1



Figure2
Normal Pinna (SACH-439)



Figure 3
Abnormal Pinna (SACH-440)



Figure 4
Abnormal Pinna (SACH-599)



Figure 5
Abnormal Pinna (SACH-631)

PLATE 2

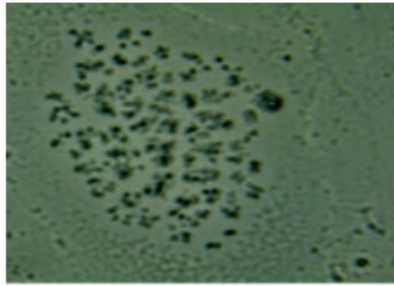


Figure 6
Meiotic Squash (n=82 at X1000)



Figure 7
Line Diagram



Figure 8
Sporangium (X400)

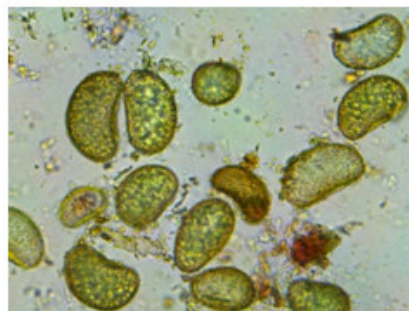


Figure 9
Spores (X400)

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