

BIODIVERSITICAL CHARACTERIZATION AND BIOCHEMICAL EVALUATION OF NATURALIZED SHRUB, ATI BALA (*ABUTILON INDICUM*) IN AGRA (UP) INDIA

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ABSTRACT

For the study of Biodiversity characterization and Biochemical analysis, the natural herb was transplanted at Botanical Garden, R.B.S. College, Agra. For the study of species diversity at four natural sites of Agra district, four formulae were used to study the maximum and minimum diversity of species at its natural sites. **Shannon Wiener's Index, Menhinick's Index, Margalef's Index value** at four different sites was given in **Table -1**. These values determined the biodiversity variation at natural sites in *Abutilon indicum*. The values of Moisture contents (%), Oil content (%) and Protein concentration ($\mu\text{g}/\text{ml}$) in *Abutilon indicum* were also determined with variation at biochemical level **Table -2**. With the help of SDS-PAGE, in four samples of seeds of *Abutilon indicum* from four natural sites (**Bichpuri site -Lane 1, Kailash site -Lane 2, Kheria site - Lane 3, Chhalesar site - Lane 4**). The total no. of protein bands showed diversity in *Abutilon indicum* plant in **Table: 3**. Shannon-Wiener's Index, Menhinick's Index, Margalef's Index and Similarity Index (S) were applied to determine the distribution patterns and concentrations of wild species to pinpoint the diversity built-up and variation in the gene pool and identifying sites for *in-situ* conservation. The present work determined the status of diversity of experimental herb at particular four sites the need to conserve this diversity for current and future use.

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KEY WORDS : Biochemical evaluation, Biodiversitital characterization, Shrub plant

Introduction

Man has always been fascinated by the diversity of life. The term 'Biodiversity' was first used² in its long version and is most commonly used to describe the number of species. Recognizing that conventional methods of determining and separating species were inadequate, others elaborated the definition by including the variety and variability of living organisms. Biodiversity entails all forms of biological entities inhabiting the km including prokaryotes and eukaryotes - wild plants and

animals, micro-organisms, domesticated animals and cultivated plants and even genetic material like seeds and germplasm¹. The Indian region (60°45' to 37°06' N and 69°07' to 97°025' E) has a land frontier of 15,200 km and a coastline of 5400 km. In the north it is bounded by Tibet, Nepal and Bhutan; in the northwest by Pakistan; in the northeast by Myanmer (formerly Burma) and in the east by Bangladesh. The southern Peninsula extends into the Indian Ocean with the bay of Bengal lying to the southeast and the Arabian sea to southwest. Biogeographically India

TABLE -1 : Biodiversity variation in *A. indicum* at various sites.

| Diversity indices | Species Name | Bichpuri site | Kailash site | Kheria site | Chhalesar site |
|------------------------------|-------------------------|---------------|--------------|-------------|----------------|
| Shannon Wiener's Index Value | <i>Abutilon indicum</i> | -0.1201 | -0.1210 | -0.1322 | -0.1399 |
| Menhinick's Index Value | <i>Abutilon indicum</i> | 21 | 28 | 20 | 19 |
| Margalef's Index Value | <i>Abutilon indicum</i> | 531.1 | 614.4 | 514.0 | 496.8 |
| Similarity Index | <i>Abutilon indicum</i> | + | + | + | + |

is situated at the trifunction of three realms namely Afrotropical, Indo-Malayan and Palearctic realms and therefore, has characteristic elements from each of them. This assemblage of three distinct realms makes the country rich and unique in biological diversity. The climate of India is extremely varied from the cold perpetually snow clad mountain peaks in the north to some of the hottest places on earth in the Thar-desert; from the near zero rainfall areas to the world's wettest areas in the northeast India. For this reason India is one of the 12 mega biodiversity countries of the world. Worker⁴ accounts for 11 per cent of the recorded species of the world. According to others³. Anthropogenic disturbance in the natural environment have caused destruction of plant habitats to varying degrees as a result of permanent or temporary disturbances in the various ecosystems. Increased developmental activities accelerate these changes consequently nearly 33 per cent of the plant species have become endemic, located mainly in 26 endemic centre of India. The red data books published recently enlists 814 sensitive species. Significant losses of biological diversity could affect the future well being of human life.

Keeping in view the above problems in conserving biodiversity, the present work has been undertaken in special reference to Agra, which is situated in Uttar Pradesh at 26°44' to 77°55' N and 77°26' to 78°32' E and surrounding by 4 states Bihar, Rajasthan, Haryana and Madhya Pradesh with varied types of soils viz., alkali,

ravenous and fertile, soils harboring a range of diversified plant species.

Material and Method

For the study of Biodiversity characterization and Biochemical analysis of herb, four localities of Agra were selected. These sites were selected keeping in view the minimum biotic pressure on the vegetative and variability in edaphic factors. Following four sites were selected for the experiment (Map -1) (Fig. 1):

1. Bichpuri (West of Agra city)
2. Chhalesar (East of Agra city)
3. Kailash Yamuna (North of Agra city)
4. Kheria Air Port Area (South of Agra city)

Experimental Site:

For the study of Biodiversity characterization and Biochemical analysis, the natural shrub was transplanted at Botanical Garden, R.B.S. College, Agra. This farm is situated within the semi-arid and sub-tropical zone of Uttar Pradesh at 27.20° N latitude and 77.90° E longitude and is 163 meters above the mean sea level. The summers are extremely hot and dry. The winters are fairly cool and at times frost in First week of November to the last week of December. The average minimum and maximum temperature are 11°C and 44°C respectively with chilling cold winter and desiccating hot winds of summers. The mean annual rainfall is around 65cm. The major part of

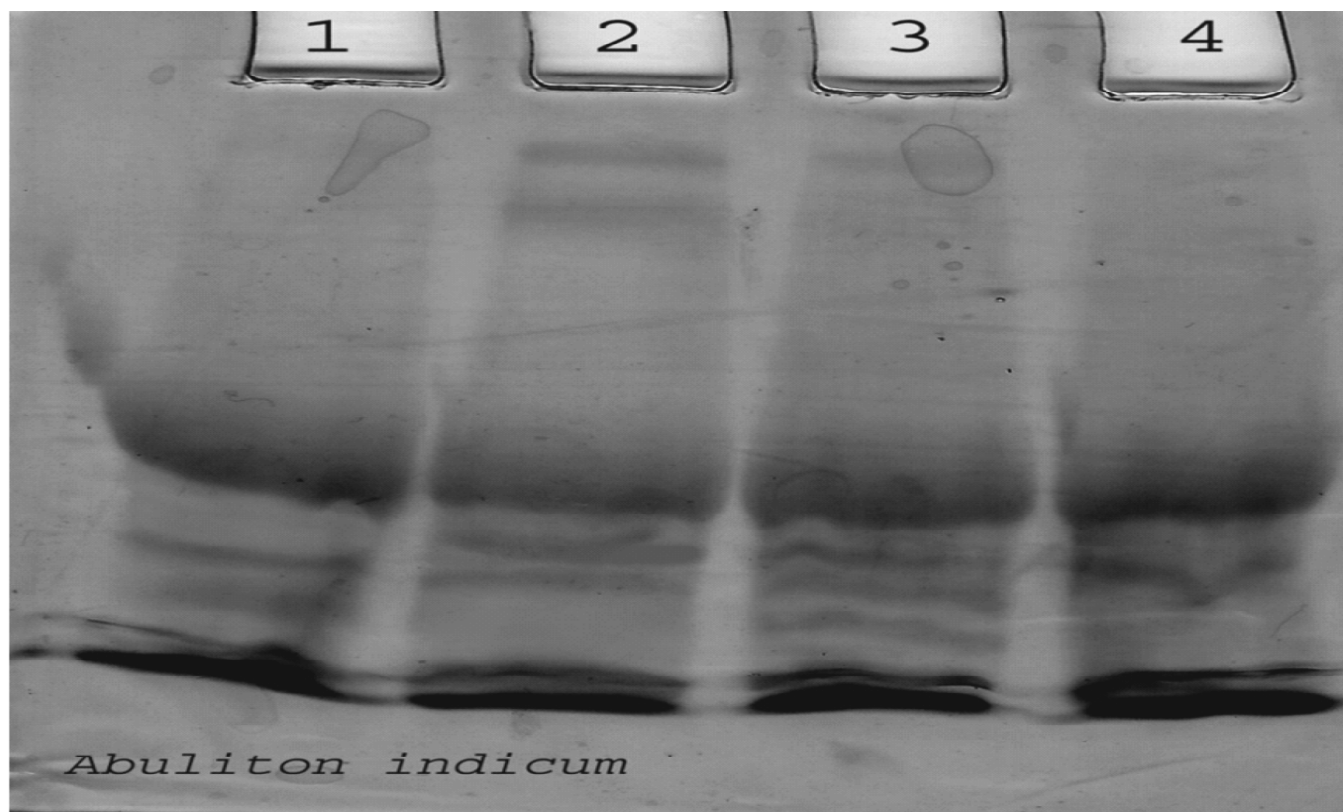


Fig. 1 :Total number of bands in lane 1, 2, 3 & 4 in *Abutilon indicum*.

TABLE:- 2 : Ingredients of the species of different sites

| Diversity indices | Species Name | Bichpuri site | Kailash site | Kheria site | Chhalesar site |
|------------------------|-------------------------|---------------|--------------|-------------|----------------|
| Moisture Content (%) | <i>Abutilon indicum</i> | 7.60 | 7.72 | 7.61 | 7.52 |
| Oil Content (%) | <i>Abutilon indicum</i> | 15.11 | 16.23 | 16.20 | 11.12 |
| Protein concn. (µg/ml) | <i>Abutilon indicum</i> | 525.09 | 577.45 | 551.69 | 491.32 |

which was received during July to September with Occasional showers during winters. Soil is sandy loam type and slightly alkaline in nature (7.8 pH). For the study of species diversity at four natural sites of Agra district, four formulae were used to study the maximum and minimum diversity of species at its natural sites. For studying the species richness (diversity indices) following formulae were used.

For species richness (Diversity indices)

1. Shannon-Wiener's Index

$$H' = - \sum \left[\left(\frac{n_i}{N} \right) \log_n \left(\frac{n_i}{N} \right) \right]$$

where,

H' = Index value

n_i = Number of individuals of ith species

N = Total number of individuals of all species

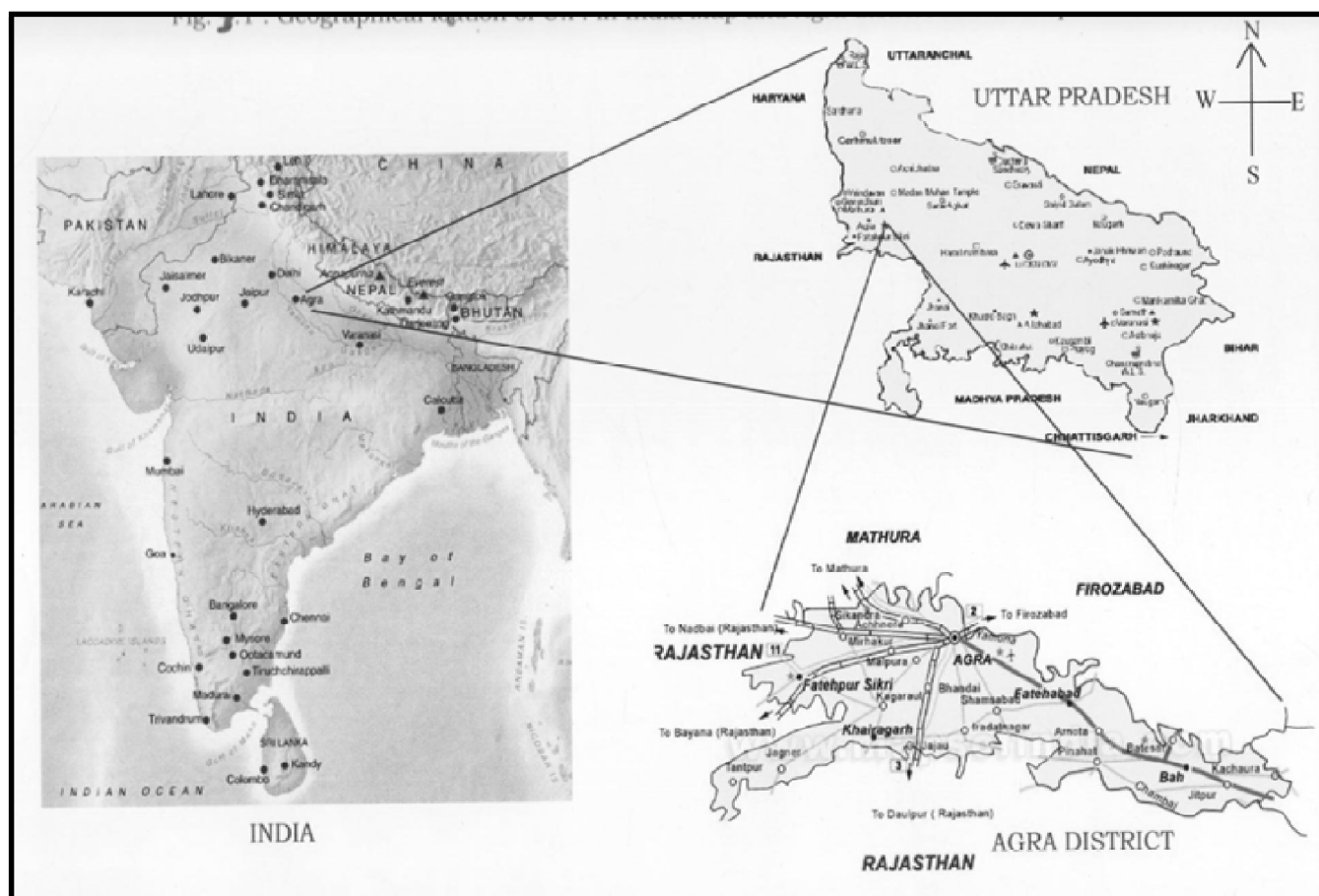


Fig. 2 : Geographical location of U.P. in India Map and Agra district in U.P. Map.

2. Menhinick's Index

$$D_b = \frac{S}{\sqrt{n}}$$

Where, S = Number of species
n = Number of individuals

3. Margalef's Index

$$D_a = \frac{S - 1}{\log n(n)}$$

Where, S = Number of species
n = Number of individuals

4. Similarity Index

$$S = 100 \times \frac{2c}{(a+b)}$$

Where,

- a = Number of species present in 1 site
b = Number of species present in 2 site
c = Number of species present in both sites.

Experiment: Biodiversity was studied, based on

Biochemical analysis in seed of natural herb, which was selected from four particular sites. These four sites of seed of herb were analyzed for following Biochemical parameters:

1. Percentage of oil contents in seeds at four selected sites: The oil content was determined by extracting with a petroleum hydrocarbon solvent.
2. Percentage of moisture content in seed at four selected sites.
3. Protein isolation from seeds of herb at 4 natural sites.
4. Protein estimation in seeds of herb at 4 natural sites.
5. Sodium Dotecyl Sulphate Polyacrylamide Gel Electrophoresis (SDS - PAGE) in seeds protein of herb at 4 natural sites.

Result and Discussion

The plant species has been collected randomly from the four natural sites of Agra district. For the study of species, richness (diversity) put the four formulae, which showed the maximum and minimum diversity of species at its natural sites.

Shannon Wiener's Index, Menhinick's Index, Margalef's Index value and Similarity Index at four different sites were given in Table -1. These values determined the

TABLE:-3 : Total number of band in lane 1, 2, 3 and 4 in *Abutilon indicum*

| Total Number of Bands | Lane 1 | Lane 2 | Lane 3 | Lane 4 |
|-----------------------|--------|--------|--------|--------|
| 0.6905 | + | + | + | + |
| 0.7976 | + | + | - | - |
| 0.8929 | + | - | + | - |
| 0.9523 | + | + | - | + |
| 0.0298 | - | + | - | - |
| 0.1190 | - | + | - | - |
| 0.7380 | - | + | - | - |
| 0.0238 | - | - | + | - |
| 0.7500 | - | - | + | - |
| 0.7977 | - | - | + | - |
| 0.9524 | - | - | + | - |
| 0.7857 | - | - | - | + |

biodiversity variation at natural sites in *Abutilon indicum* (Table-1).

The values of Moisture contents (%), Oil content (%) and Protein concentration ($\mu\text{g}/\text{ml}$) in *Abutilon indicum* were also determined the variation at biochemical level. (Table-2).

With the help of SDS-PAGE, in four samples of seeds of *Abutilon indicum* from four natural sites (Bichpuri site -Lane 1, Kailash site -Lane 2, Kheria site - Lane 3, Chhalesar site - Lane 4) the total number of protein bands showed diversity in *Abutilon indicum*. (Table-3).

The lane 1 (Bichpuri region) the number of bands were 4 while at lane 2 (Kailash region) the number of bands were 6. In lane 3 (Kheria region) the number of bands were 6, while at lane 4 (Chhalesar region) the number of band were 3.

Shannon-Wiener's Index, Menhinick's Index, Margalei's Index and Similarity Index (S) were applied to determine the distribution patterns and concentrations of wild species to pinpoint the diversity built-up and variation in the gene pool and identifying sites for in-situ conservation. The present work determined the status of diversity of experimental herb at particular four sites the

need to conserve this diversity for current and future use. Due to all these aspects, significant losses of biological diversity could affect the future well being of human life. Simplification of ecosystem and extinction of species diminish future resource options and the ability of nature to provide life supporting ecological services. Conservation is an approach that balances people's short and long term needs for natural resources through management of land, workers and biota to restore, maintain or enhance basic land health and productivity. Efforts at conservation are only fruitful with a holistic approach to the eco-system capacity, peculiarities which demands co-ordination between the organization engaged in this task. The research highlights the biodiversity of herbs and their monitoring and evaluation their biochemical changes due to change in their climatic habitat condition. The major aim of biodiversity conservation is to assist human societies in the sustainable utilization of biological system and their management. This can only be achieved firstly by effectively conserving biodiversity at the national and regional levels and secondly by organizing research to understand the subtleties of ecosystem functioning, species need and inter-relations to enable comprehend the basics for use in their management.

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