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Floristic Survey of Deedwana Tehsil, District Nagaur, Rajasthan

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Abstract: ***The present research paper presents a comprehensive floristic study of Deedwana Tehsil, District Nagaur, Rajasthan, aimed at documenting the plant diversity and understanding its ecological significance. The study involved extensive field surveys, specimen collections, and interviews with local experts to identify and classify the plant species within the region. The results revealed a diverse and unique assemblage of plant species in Deedwana Tehsil, representing various vegetation types and habitats. The enumeration of identified plant species showcased a rich floral diversity, including both native and exotic species. A total of 331 species of angiospermic plants belonging to 218 genera and 65 families were recorded including four series of natural vegetation in Deedwana tehsil: 1. Acacia nilotica-Maytenus emarginata-Balanites aegyptiaca series 2. Prosopis cineraria-Crotalaria burhia-Leptadaenia pyrotechnica series. 3. Prosopis cineraria- Capparis decidua-Tephrosia purpuria series and 4. Suaeda fruticosa-Cressa cretica–Heliotropium curassavicum series. (Quereishi, 2018). The study also provide information about the traditional uses of plants by local communities, providing insights into their cultural significance and medicinal applications. Traditional knowledge holders and local healers shared valuable information about medicinal plant practices, adding to the understanding of the region's traditional healthcare systems. The study also analyzed the major threats faced by the flora of Deedwana Tehsil, such as habitat loss, overgrazing, climate change, and unsustainable resource extraction. These findings highlighted the urgent need for conservation and sustainable management initiatives to protect the region's botanical wealth.***

Keywords: Floristic Study, Vegetation types, Arid and semi-arid region, Deedwana, District Nagaur

I. INTRODUCTION

India occupies a special status in terms of ecosystem, species and genetic diversity because of its location in the tropical zone, physical features and eco-climatic conditions.

Rajasthan is the largest state of India and is situated in the north-western part of India between 23^0 3'N and 30^0 12'N latitude and $69^0$30E and $78^0$17'E longitude, occupying an area of 3,42,239 sq.km. The elevation of land surface varies from 214 to 1375 m. In shape, it is an irregular rhomb with north-south and east-west diagonals, the former about 784 km. and the latter 850 km. long. The remarkable feature of Rajasthan is the Aravalli range, perhaps the oldest folded mountain range in the world. It intersects Rajasthan from end to end, diagonally running from Delhi to the plains of Gujarat for a distance of about 692 km. It has a wide range of habitats, climatic factors, physiography, soil types and geological antiquity. Aravalli range divides the whole of Rajasthan into two natural divisions i.e. three fifth lying on northwest and two fifth on the east and south-east.

Nagaur district is located in the centre of the Rajasthan state between 26°23' and 27°42' north latitudes and 73°40' and 75°15' east longitudes. This district covers an area of 17,718 sq. km. which is about 5.177% of total area of the state. The present study is a report based on survey of angiospermic plants of Deedwana tehsil of Nagaur district (Fig.1). A total of three hundred thirty one species, grouped into two hundred eighteen genera, assigned to sixty five families according to Bentham and Hooker's system of classification have been recorded from Deedwana tehsil.

Deedwana Tehsil, located in the Nagaur district of Rajasthan, India, is a region known for its unique ecological and environmental characteristics. The Tehsil is situated in a semi-arid region, making it an area of great ecological significance due to its distinctive flora and vegetation specially for salt loving plants (halophytes). Despite its ecological importance, the flora of Deedwana region has not received adequate scientific attention, and there is limited research focusing on the plant diversity and distribution in the area. Therefore, a comprehensive and systematic floristic study is essential to document and understand the plant diversity, conservation status, and ecological dynamics of Deedwana region. The primary purpose of this research is to conduct a comprehensive floristic study of Deedwana Tehsil, District Nagaur, Rajasthan including- document and enumerate the plant species found within the study area, including both native and exotic species, To assess the floristic diversity and composition, identification and classification of plant species, identify and document any endemic or rare plant species present in the region, and evaluate their

conservation status, exploring the traditional uses of plants by local communities, including medicinal, cultural, and economic significance, analyze the various habitats and vegetation types of region, study the ecological factors influencing plant distribution.
The study will help in identifying and understanding rare, endangered, and endemic plant species, which are crucial for formulating effective conservation strategies to protect the region's unique biodiversity. The research will contribute to the existing body of knowledge in botany, specifically on the flora of semi-arid regions, and serve as a valuable reference for future research and comparative studies. By addressing these objectives and highlighting the significance of the flora in Deedwana Tehsil, this research aims to contribute to the broader field of botany, ecology, and conservation, ultimately supporting evidence-based policymaking and sustainable development initiatives in the region.

II. REVIEW OF LITERATURE

Rajasthan, the largest state in India, is characterized by diverse landscapes, ranging from arid deserts to semi-arid regions and fertile plains. Its unique ecological features have attracted researchers to explore and document its flora over the years. These studies have focused on various aspects, including taxonomy, ecology, conservation, and traditional knowledge related to plants.
In recent years numerous studies have been conducted to understand the botanical diversity and distribution patterns across different regions of the state dealing with the flora and floral composition of Rajasthan and reviewed by Jain (1970) Bhandari (1978), Sharma (1980). Publication of Flora of Indian Desert (Bhandari, 1990), Flora of north-east Rajasthan (Sharma & Tiagi, 1979) and Flora of Rajasthan (Shetty & Singh, 1987) have further added to our knowledge of the flora and floral composition of Rajasthan. District flora of Tonk (Shetty & Pandey, 1983) and Banswara (Singh, 1983) district of Rajasthan have been published. Quereishi (2002), Sharma & Aggarwal (2008) and Quereishi & Vyas (2017), Quereishi (2018,) have significantly contributed in the existing knowledge about the vegetation of Deedwana and Nagaur. Intensive botanical exploration of Nagaur district of Rajasthan is in progress including study of phytodiversity of Deedwana tehsil.\

III. AIM OF THE STUDY

Conservation and protection of natural wealth is urgent need of human being for survival. The Phytodiversity study leads to an up to-date knowledge of the vegetation of the study area. In Rajasthan, many commercially and medicinally important species of tree flora, several others are facing severe threats of extinction due to grazing, mining and by the use of new instruments. The present work on the flora of Deedwana tehsil has now been taken up by the author for investigation along the following lines.

1) An enumeration of all the species of angiosperms occurring in Deedwana tehsil.
2) Preparation of artificial keys for the identification of families, genera and species.
3) A comparison of this flora with that of neighboring areas viz. Delhi, Upper Gangatic plains, Western Rajasthan, District Ajme
4) Ecological studies including habitat-wise classification and distribution patterns of plant communities, effect of biotic and climatic stress conditions on this flora.

IV. METHODOLOGY

The survey for plant collection and observation were conducted at regular interval throughout the year for five years using random quadrates of 100 X 100 cm^2. Excursions were undertaken two to three times a month. Field trips were arranged in such a way to cover all the locations at more or less regular intervals to collect most of the plants in flowering and fruiting stages. All the specimen collected were serially numbered.
The field notes included habit, habitat, colour of flowers, associations etc have noted and used. Ten samples were studied every time in different sites to facilitate biogeographical comparison of species richness. The present work is an endeavor to begin with the phytodiversity of this region. For the collection of voucher specimens as future reference and their preservation, herbarium methodology given by Jain & Rao (1976) was followed. Provisional identification was made by the help of Duthie's FUGP (Vol 1-2 repr. 1952), santapau's Fl. Saur. (Vol 1952), Hooker's flora (Vol 1-7 repr. 1952) and Flora of Rajasthan (Sharma & Tiagi, 1979; Bhandari, 1990, and Shetty & Singh 1987).
Further help was taken from many other monographs and revisions. These identification were later on confirmed by matching the plants with authentic specimens at the RUBL Jaipur and JAC Jodhpur. The taxa are arranged alphabetically under their respective families which are arranged according to the classification of Bentham and Hooker (1862-1883). Identification of the species is based on the flora of Bhandari (1995) and Shetty & Singh (1987-93).

V. STATISTICAL SYNOPSIS OF THE INDIGENOUS FLORA

The present work enumerates 331 species belonging to 218 genera and 65 families of flowering plants occurring in Deeedwana tehsil of Nagaur district. It is clear from table 1 that the ratio of total number of genera to species is 1: 1.51, which is rather equal to a corresponding ratio for whole of India (1:7), but it is more in conformity with this ratio for the Gangetic plain region (1:2.2) and that of Delhi state (1:1.63) as reported by Maheshwari (1963). It is rather surprising that family Leguminosae tops the list of all flowering plants in Deedwana tehsil , while in the adjoining areas like western Rajasthan and eastern Rajasthan it is family Poaceae which occupies top position. It may be mentioned here that family Poaceae has been found to be the most dominant family in the Gangetic plains, Gujarat and Delhi regions also and next position in all these regions is occupied by family Leguminosae. Thus these two families have inter-changed their positions in the area presently investigated. Family Asteraceae occupies third position in the flora of Deedwana tehsil which is in conformity with Delhi and remaining areas of Flora of western Rajasthan. On the whole referred to as “Grass Legume” type. But in Deedwana tehsil which is a part of Nagaur district which in turn is a segment of western Rajasthan may be referred to as “Legume Grass” type on the basis of dominance of legumes in its flora followed by grasses (Quereishi, 2018). Most of the area of Deedwana tehsil comes under semi-arid climate. Consequently, it is characterized by sandy, salty and gravelly plain, more or less devoid of vegetation except in the rainy season when multitudes of ephemerals come up and transform the bare land in to a green carpet. These ephemerals complete their life-cycle before the advent of summer heat and the bulk of the area is again transformed into open sandy or salty plain. In general the vegetation in this semi-arid region is sparse. Plants with only xerophytic adaptations are able to establish themselves. The bulk of vegetation consists of stunted, thorny or prickly shrubs and perennial herbs capable of drought resistance. These occur in open clump formations in the plains with plenty of vacant spaces between them. Distinctly scattered trees of stunted growth are found along depressions. The vegetation mainly consists of stunted or dwarf grasses interspersed with few characteristic desert shrubs. Depending upon the rain water availability, the vegetation can also be distinctly divided in to ephemerals and perennials.

Table 1: Proportional relationship of dicotylelonuos and Monocotylelonuos taxa in Deedwana tehsil

Group	FAMILIES		GENERA		SPECIES	
	NO.	%	NO.	%	NO.	%
DICOTS	58	89.23	185	84.86	284	85.80
MONOCOTS	07	10.77	33	15.13	47	14.19
TOTAL	65	100	218	100	331	100

Table 2: Number of genera and species in each families

S.No.	FAMILY	Genus/ Genera	No. of Species	S.No.	FAMILY	Genus/ Genera	No. of Species
1	MENISPERMACEAE	2	3	34	SALVADORACEAE	1	2
2	PAPAVERACEAE	1	1	35	APOCYNACEAE	1	1
3	FUMARIACEAE	1	1	36	ASCLEPIADACEAE	5	5
4	BRASSICACEAE	2	2	37	PERIPLOCACEAE	1	1
5	CLEOMACEAE	1	6	38	GENTIANACEAE	1	1
6	CAPPARACEAE	3	4	39	BORAGINACEAE	5	11
7	POLYGALACEAE	1	2	40	EHRETIACEAE	1	2
8	CARYOPHYLLACEAE	3	3	41	CONVOLVULACEAE	7	16
9	PORTULACACEAE	1	3	42	CUSCUTACEAE	1	2
10	TAMARICACEAE.	1	2	43	SOLANACEAE	5	9
11	ELATINACEAE	1	2	44	SCROPHULARIACEAE	8	9
12	MALVACEAE.	6	10	45	OROBANCHACEAE	2	2
13	TILIACEAE	2	6	46	BIGNONIACEAE	1	1
14	ZYGOPHYLACEAE	4	6	47	PEDALIACEAE	2	2
15	OXALIDACEAE	1	1	48	MARTYNIACEAE	1	1
16	SIMAROUBACEAE	1	1	49	ACANTHACEAE	7	7
17	BALANITACEAE	1	1	50	VERBENACEAE	2	2

18	BURSERACEAE	1	1	51	LAMIACEAE	3	5
19	MELIACEAE	2	2	52	NYCTAGINACEAE	1	1
20	CELASTRACEAE	1	1	53	AMARANTHACEAE	8	13
21	RHAMNACEAE	1	2	54	CHENOPODIACEAE	4	6
22	MORINGACEAE	1	1	55	POLYGONACEAE	3	3
33	FABACEAE	16	33	56	ARISTOLOCHIACEAE	1	1
24	CAESALPINIACEAE	3	3	57	EUPHORBIACEAE	4	8
25	MIMOSACEAE	6	12	58	MORACEAE	1	2
26	COMBRETACEAE	1	1	59	HYDROCHARITACEAE	2	2
27	LYTHRACEAE	1	1	60	AGAVACEAE	1	1
28	CUCURBITACEAE	10	17	61	LILIACEAE	2	2
29	CACTACEAE	1	1	62	COMMELINACEAE	1	2
30	MOLLUGINACEAE	5	6	63	ARECACEAE	1	1
31	A IZOACEAE	3	5	64	CYPERACEAE	3	9
32	RUBIACEAE	4	5	65	POACEAE (GRAMINEAE)	23	29
33	ASTERACEAE	21	26				

Table 3. SYNOPSIS OF THE INDIGENOUS FLORA

Ten dominant families of Deedwana tehsil and adjoining regions (Family Leguminoseae here includes the three families Fabaceae, Caesalpinaceae and Mimosaceae taken together)

POSITION	**Gangetic plain (Hooker, 1907)**	**Delhi (Maheshwari, 1963)**	**Jaipur (Sharma & Tiagi, 1979)**	**W. Rajasthan (Bhandari, 1990)**	**Deedwana tehsil (Present work)**
1	POACEAE	POACEAE	POACEAE	POACEAE	LEGUMINOSEAE
2	LEGUMINOSEAE	LEGUMINOSEAE	LEGUMINOSEAE	LEGUMINOSEAE	POACEAE
3	CYPERACEAE	ASTERACEAE	ASTERACEAE	ASTERACEAE	ASTERACEAE
4	ASTERACEAE	CYPERACEAE	CYPERACEAE	CYPERACEAE	CUCURBITACEAE
5	SCROPHULARIACEAE	ACANTHACEAE	ACANTHACEAE	CONVOLVULACEAE	CONVOLVULACEAE
6	MALVACEAE.	EUPHORBIACEAE	EUPHORBIACEAE	MALVACEAE	AMARANTHACEAE
7	ACANTHACEAE	AMARANTHACEAE	BORAGINACEAE	EUPHORBIACEAE	BORAGINACEAE
8	EUPHORBIACEAE	MALVACEAE	MALVACEAE	ACANTHACEAE	MALVACEAE
9	CONVOLVULACEAE	AMARANTHACEAE	AMARANTHACEAE	CUCURBITACEAE	SCROPHULARIACEAE SOLANACEAE CYPERACEAE
10	LAMIACEAE	SCROPHULARIACEAE	CUCURBITACEAE	AMARANTHACEAE	EUPHORBIACEAE

TABLE-4
DOMINANCE OF FAMILIES
A comparative statement of first ten families

SN	NAME OF FAMILY	INDIA HOOKER 1907	UPPER GANGEFIC PLAIN	RAJASTHAN DESERT (BLATT. & HALLB., 1953)	JAIPUR DISTRICT (SHARMA, 1974)	RAJASTHAN (JAIN, 1970)	DEGANA TEHSIL MUKESH KHANDELWAL, 1999)	DEEDWANA TEHSIL (PRESENT WORK, 2002)
1	ORCHIDACEAE	1	-	-	-	-	-	-
2	POACEAE	3	1	1	1	1	2	2
3	LEGUMINOCEAE	2	2	2	2	2	1	1
4	ASTERACEAE	7	4	3	3	3	3	3
5	CYPERACEAE	8	3	4	4	4	4	9
6	ACANTHACEAE	6	7	-	5	5	5	-
7	RUBIACEAE	4	-	-	-	-	-	-
8	EUPHORBIACEAE	5	6	9	6	6	5	10
9	CONVOLVULACEAE	-	7	5	5	9	7	5
10	BORAGINACEAE	-	-	7	7	-	7	7
11	AMARANTHACEAE	-	9	6	9	-	10	6
12	MALVACEAE	-	8	10	8	7	5	8
13	SCROPHULARIACEAE	-	10	-	10	10	-	9
14	CUCURBITACEAE	-	-	8	10	-	6	4
15	TILIACEAE	-	-	-		-	10	-
16	SOLANACEAE	-	-	-		-	9	9
17	LAMIACEAE	9	-	-		8	8	-
18	URTICACEAE	10	-	-		-	-	-
19	ASCLEPIADACEAE	-	-	-		-	-	-

VI. CONCLUSION AND DISCUSSION

Since the publication of King's "Sketch of the flora of Rajputana" in 1879, many workers have contributed to our knowledge of the flora of Rajasthan. Blatter & Hallberg (1918-1921) published a remarkable pioneering work on the plants of the Indian desert. Shantisarup (1951, 1954) listed plants of Jodhpur and its neighbourhood. Sankhala (1951) enumerated plants of the north western Rajasthan together with their life-forms. Similar lists of the plants of Jaisalmer and Bikaner were compiled by Shantisarup (1957, 1958). Das & Shantisarup (1951), Shantisarup (1952), Agarkar (1952), Biswas (1952), Ratnam & Joshi (1952), Nair & Joshi (1955) and Joshi (1958) have studied ecology and plant associations of this region.

For north-eastern region of Rajasthan there have been very few contributions and the earliest of them is the report on the forest of erstwhile Jaipur state by George (1937) followed by Joshi's (1957) report on the comparative study of vegetation of some areas in Jaipur division. Sarup (1961) made a preliminary study of hydrophytes of Bharatpur and Gandhi et al., (1961) published a list of grasses of Jaipur. Vyas (1962-1967) studied the various aspects of the vegetation of Alwar, its

comparison with that a north-eastern Rajasthan (1964a), its grass-land communities (1964b) etc. However except his communications on the contributed to the ecology of this region. With Gupta (Vyas and Gupta, grasses of Alwar (1962), Cyperaceae of Alwar (1966), he mainly 1962) he enumerated the medicinal plants of Alwar and described the vegetation of Tijara and its neighbourhood. The vegetation types of Jaipur have been discussed by Verma (1967) and the first systematic taxonomic report on Jaipur district was by Sharma (1974).

The present study is a report based on survey of Angiospermic plants of Deedwana tehsil over a period of five years. Regular and periodical visits to different habitats were made during these years of intensive survey. A total of 331 species, grouped into 218 genera, assigned to 65 families according to Bentham and Hooker's system of classification have been recorded from Deedwana tehsil. Families that are represented in Deedwana tehsil under survey by a single species are: Papaveraceae, Fumariaceae, Oxalidaceae, Simaroubiaceae, Balanitaceae, Celastraceae, Moringaceae, Combretaceae, Lythraceae, Cactaceae, Apocynaceae, Periplocaceae, Gentianaceae,

Bignoniaceae, Martyniaceae, Nyctaginaceae, Aristolochiaceae, Agavaceae, and Arecaceae. Of these 19 families, 17 belong to dicots and the remaining 2 to monocots.

Families with more than one species in the single genus are: Cleomaceae, Polygalaceae, Tamaricaceae, Elatinaceae, Rhamnaceae, Salvadoraceae, Ehretiaceae, Cuscutaceae, Moraceae, Commelinaceae.

Quite a large number of Families have the number of species between three to five; Following families have three to five species each. Menispermaceae, Capparaceae, Caryophyllaceae, Portula-caceae, Caesalpiniaceae, Aizoaceae, Rubiaceae, Asclepiadaceae, Lamiaceae, and Polygonaceae Families in which the number of species is between six to ten include: Cleomaceae, Malvaceae, Tiliaceae, Molluginaceae, Sola-naceae, Scrophu-lariaceae, Acanthaceae Chenopodiaceae, Euphorbiaceae, and Cyperaceae.

Families with number of species between eleven and more represented in Deedwana tehsil are: Fabaceae, Caesalpiniaceae, Mimosaceae, Cucurbitaceae, Asteraceae, Boraginaceae. Convolvulaceae, Amaranthaceae, and Poaceae.

There are about 30 tree species, including, meso-phanerophytes i.e., they attain a height of 8 to 30 meters; microphanerophytes, reaching a height of 8 meters. There is not a single tall tree ormegaphanerophyte in this area. Of the families occurring in Deedwana tehsil, only 21 families are represented by trees exclusively, viz., Tamaricaceae, Simaroubaceae, Burseraceae, Meliaceae, Celastraceae, Moringinaceae, Combretaceae, Salvadoraceae, Bignoniaceae, Moraceae, Arecaceae, Ehretiaceae, Verbenaceae, Euphorbiaceae, Fabaceae, Rubiaceae, Tiliaceae, Apocynaceae, Rhamnaceae, Caesalpiniaceae and Mimosaceae. The trees are mostly found near hydric habitats or on hills, rarely in the sandy areas.

Few species, distributed among different families occur perennial climbers. Families showing all the habit forms viz, trees, shrubs, climbers and herbs are not many. Those which are represented are: Tiliaceae, Caeselpiniaceae, Verbenaceae, Euphorbiaceae and Fabaceae. Orchidaceae, the most

dominant family for the Indian sub-continent (Hooker, 1907) is not represented in this area even by a single species; the reason for this is evident, there being no moist shady habitats. Unlike Indian sub-continent (Hooker, 1907), Saurashtra, western Rajasthan (Bhandari, 1990) and Jaipur district (Sharma & Tiagi, 1979) Leguminoseae tops the list of families of this tehsil and the other neighbouring areas. The family Poaceae occupy the second position and the third position is occupied by Asteraceae.

The present studies also conform to the findings of Maheshwari (1963) for the Delhi area and Blatter & Hallberg (1918-21) for the Rajasthan desert. As compared with the above (Table 8.1), with slight changes in position the families occupying fifth to tenth positions are Acanthaceae, Malvaceae and Euphorbiaceae, Cucurbitaceae, Boraginaceae, Colvolvulaceae, Lamiaceae, Solanaceae, Tiliaceae and Amaranthaceae.

Due to the variety of habitat conditions and consequently great diversity in flora and vegetation types, the subject of conservation of plant resources is very complex in India. However to keep the problem within apprehensible limits, the subject can be approached from three angles.

1) Conservation of different vegetation types occurring in the country: The vegetation type in an area is the expression of interaction of a number of components of the ecosystems such as the soil condition, climate, interrelationship between the constituent species and biotic or anthropogenic influences. But for any natural calamities or unnatural interference like excessive human activity, etc., the vegetation type usually continues to survive as a stable ecosystem. It is essential for us from national as well as international view-point to maintain the prospective areas of the country having different vegetation types for posterity. Due to practical difficulties in maintaining too many or very large areas as preserved areas has been mooted and is being implemented in several parts of areas of vegetation types, the concept of biosphere reserves in selected the world.

2) Conservation of rare and endemic taxa: Most of the species of our flora grow in abundant quantities and are likely to continue to survive in future. However, this is not true for all the species. Some taxa are subjected to one or the other threat, which is natural or unnatural and unless serious efforts to exclude these threats, or plans of their recovery are implemented, there is little hope of continuity of their survival. Enough has been written on the various causes of threat and ways of rectifying them. The fact remains that several thousands plants in the world and a few thousands in our country are rare and vulnerable. Many of them are not of any immediate visible economic value except their botanical or ornamental significance yet, adequate measures of their protection need to be taken.

3) Conservation of genetic diversity: It is well known that crop improvement programmes largely depend on hybridization with related races or species having desired characters or traits. Large-scale cultivation of improved varieties of crops and other cultivated plants has in many cases endangered the survival of their undeveloped or wild It is necessary that wild populations in the forests and undeveloped races in the agricultural fields of the rural and primitive people are made to survive for future use in breeding.

The importance of floristic studies in different parts of the country and proper taxonomic concepts of endemic or rare plants and relatives of crop plants cannot be over-emphasized. For many areas in our country, which are rich in botanical wealth, full inventories of plants are not available. Somehow, most of the recently published floristic accounts relate to university towns or areas of tourists' interest like hill-resorts and sacred places. One can mention for example, the floras of Delhi, Gorakhpur, Bhopal and Bangalore in the first category and Naini Tal, Mussoorie and Kodaikanal in the latter category. Floristic accounts of dense and remote forest areas which are the potential locations for biosphere reserves are mostly not available. Lately, such studies have been intensified in areas such as Silent Valley, Nanda Devi, Khasi Hills, Garhwal Himalayas, Namdapha and other areas in Arunachal Pradesh and Andaman and Nicobar islands, etc. Adequate inventory of all plants growing in an area is essential for highlighting its importance for biosphere reserves or other category of protected area and in fact, for all purposes of conservation. It is difficult to convince the decision maker to exclude human intereference in any area without clearly bringing out the uniqueness of flora of that area, which can only be done by appropriate floristic studies. Studies by the Botanical Survey and certain other institutions have been able to bring it out fairly successfully in the case of Silent Valley area.

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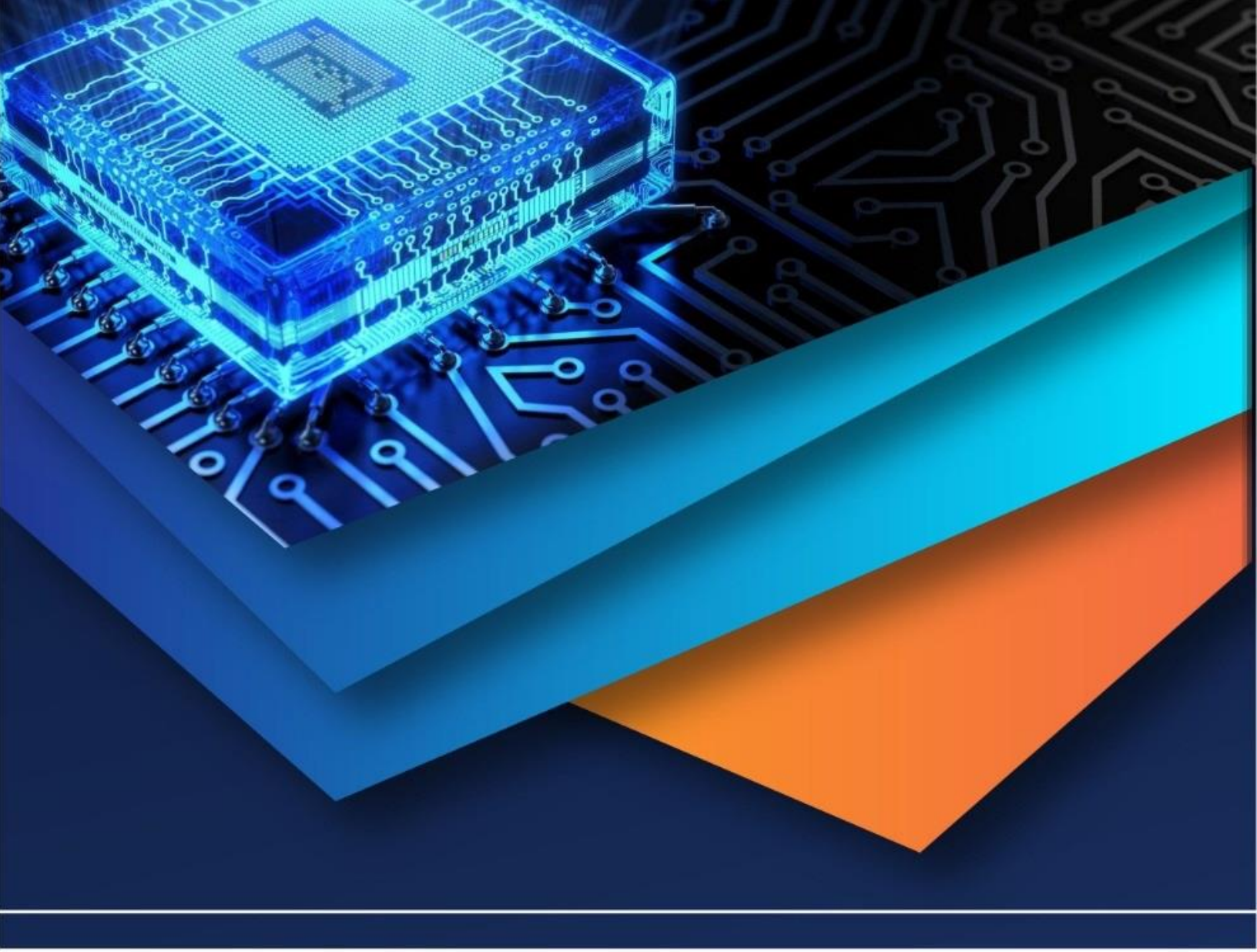

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