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Road Side Plant Diversity in City Area of Nanded

Khan. K. Zuber[1], Khan Ajmeri[2], Pathan Umar K.[3], Dhuldhaj Umesh P.[4], Khan Tuba. S[5], Siddiqui. M.M.[6], Mulani R.M.[7]
[1, 2, 3, 4, 5, 6, 7]*Department of Botany, School of Life Science, DST- FIST Sponsored School, Swami Ramanand Teerth Marathwada University Nanded.*

Abstract: ***With the Modern urbanization, the social plantation (Especially road side) is more common in developing cities of India. The random plants were planted on roadside to alleviate from air and sound pollution cause by the automobiles. In this study, we have investigated number of plants of different families present in the Nanded city (Waghala Municipal Corporation area). We have chosen 21 random sites and location of city and counted and identified the plants present over there with the help of expert plant taxonomist. We found sum total of 692 plants of 73 plant species belongs to 34 different families, among them the dominant species were Azadirachta indica (L.), Terminalia cattapa (L.), Alstonia scholaris (L.), Delonix regia (L.), Peltophorum petrocarpum (Dc.), Ailanthus excelsa (Roxb.). Diversity indices for species richness, evenness and dominance were calculated and it was found to be; Jaccard's coefficient (0.06), Simpson dominance (0.1043 and 0.1019) and Margalef's Index was 11.099.***
Keywords: Nanded city, Road side plantations, Avenue tree.

I. INTRODUCTION

Environment protection is important objectives to save the earth from the natural disaster by conserving biodiversity. The plantations around road side are supposed to be as avenue trees. This street treasury includes significant plant diversity exceptional to adjoining background (Hunter, 1999). Road side trees have direct connection with the biodiversity of the city, it plays dynamic role in maintaining ecological equilibrium (Nazaneen Parveen *et. al*., 2015). Also it has a vital role in maintaining natural, social and physiological balance with nature and reduces the impacts air pollutions; enhance quality of air (Smith, 1981). In biodiversity, each organisms present having special role as it differs in its behavior with environment.

Dark forestry are important ecological life lines as it not only acts as a primary producer but also shelters birds, animals, insects, etc. (Ravi and Sharad, 2012), in this regards forest ecosystem is most imperative terrestrial ecosystems of the planet (Vinayaka *et. al*., 2016; Ashish *et. al*., 2006). Forest are best source of renewable energy, provides foods, shelters to wild animals and human beings, also the best reservoir of secondary metabolites having various therapeutic and industrial applications.

Road side plantations are good step towards increasing global warming, increased automobile traffic and their pollutions, industrial pollutions. Major loss of lands and biodiversity are caused due to modern developments, urbanization and industrializations (Tejashree et. al., 2012). Plantations near the industrial area helps to mitigate toxic heavy metal pollutions caused due efflux of industrial area. Plantations to the road side even on highways, helps human being in several ways, plants are natural sink to absorb air pollutants, reducing noise pollutions impacts and also it becomes shades in hot summers reduces water evaporations, prevent soil erosion because of heavy rains and wear and tear effect of automobiles. Plant diversity is to be well explained by diversity indices with the calculatation of species richness, evenness and dominance (Aguirre *et. al*., 2003; Lexerod and Eid, 2006; Pommerening, 2002; Sterba and Zingg, 2006).

II. MATERIALS AND METHODS

The selected study area was main city region of Nanded of around circumference of 64 Km^2 and 21 random sites were chosen for the further investigations. Length of each road side were kept approximately 6 Km. Weekly survey of plants was planned with convenient chosen sites and with each visit photography of plants was done with DSLR camera (Nikon D5300 24.2 MP Digital SLR Camera). During each visit twig sample of counted plants were taken for herbarium preparation and for further identification. The prepared herbarium were deposited in Plant Depository of Department of Botany, School of Life Sciences, Swami Ramanand Teerth Marathwada University, Nanded and certificate of identification was taken from Prof. Ramjan Mahamuddin Mulani (Esteemed plant taxonomist).

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Study sites are quoted as R1 to R21 which are mentioned below:

R1	SP office to Kalamandir	R2	Kalamandir to Shivajinagar
R3	Shivajinagar to Raj Corner	R4	Work shop corner to Anand Nagar petrol pump
R5	Maharana.P Chowk to Sathe Chowk	R6	Sathe chowk to ITI Corner
R7	Visava Garden to Bhagayanagar corner	R8	Anand Nagar to Visava Garden
R9	Sathe chowk to Mahivir chowk	R10	Mahavir chowk to railway station
R11	Degloor naka to Asna Bridge	R12	Asna bridge to Chhatrapti chowk via Raj Corner
R13	Chhatrapati chowk to Mahatma Phule Function hall via Ganesh Nagar	R14	SP office to Latur Road via Gordham ghat bridge
R15	Latur Road to Barki Chowk via old Mondha	R16	Barki Chowk to Dhavde Corner
R17	Dhavde Corner to Degloor naka via Chandasingh Corner	R18	Gyanmata School to Fathe Gunj Corner via Maltekdi
R19	Pawdewadi Naka to Rest House (Including Labour Colony)	R20	Ambedkar Chowk Latur Phata to Cidco Corner including Bus Stop
R21	Degloor Naka to Railway Stations via Hingoli gate		

A. Species Composition

The plantation data were collected to study frequency and abundance in each study site (Curtis, 1950). The vegetation collected, were studied for abundance, frequency and diversity indices.

B. Jaccard's Coefficient

It is one of the best methods to calculate similarity and diversity in sample sets. It calculates similarity and diversity by using ratio of intersecting set and union set, if it comes zero there is no intersecting set and if it comes one all elements are intersecting. Jaccard's coefficient was calculated manually by using following formula:

$$T = \frac{Nc}{Na + Nb + Nc}$$

where, Na - number of elements in set A
Nb - number of elements in set B
Nc - number of elements in intersecting set

C. Species Diversity

Diversity of species was calculated by richness and evenness of species by Shannon-Weiner index (Shannon and Weiner, 1963), species dominance was calculated by Simpson's index (Simpson, 1949) and Margalef (1978).

III. RESULTS

The tree density of Nanded city is 73 species (64 Genus) belonging to 30 families identified at different location of (R1-R21) (See Fig. 1 and Fig. 2). In total 692 individual trees were found in 21 sampling sites (Table 1, Table 2 and Fig. 3). The maximum observed species were Azadirachta indica L (n = 20), Delonix regia L (n = 19) and Ceasalpinia pulcherrima L (n = 19), Terminalia cattapa L (n =18), Peltophorum petrocarpum Dc (n = 18), Eucalyptus globules L (n = 17), Acacia arabica L. (n = 17), Ailanthus (n = 16) and Cassia siamea L. (n = 16). The least observed species were Hardwickia binate L (n = 1), Lawsonia inermi L (n = 1), Ravenala madagascariensis L (n = 1), Agave americana L. (n = 2) Cycas beddomi (n = 2), Roystonea regia L (n = 3), Mesua ferrea L (n = 3), Ficus carica L (n = 3), Callistemon citrinus L (n = 3), Prunus avium L (n = 3) and Plumera rubra L (n = 4) (Table 3).

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Table No 1:- List of the plant species recorded at various place in Nanded city.

Sr. No	Botanical name	Families	R 1	R 2	R 3	R 4	R 5	R 6	R 7	R 8	R 09	R 10	R 1	R 12	R 13	R 14	R 15	R 16	R 17	R 18	R 19	R 20	R 21
1	Mangifera indica.L.	Anacardiaceae	-	+	+	-	-	+	-	-	+	+	+	+	+	+	+	+	-	+	+	+	-
2	Annona reticulata.L	Annonaceae	-	-	-	-	-	-	-	+	-	-	+	+	+	+	-	-	-	-	-	-	-
3	Annona squamosa.L	Annonaceae	-	-	-	-	-	-	-	+	-	+	+	+	+	+	+	+	+	+	+	+	+
4	Polythenia longifolia. Roxb	Annonaceae	+	+	+	+	+	+	+	+	+	+	-	-	+	+	+	-	+	-	-	+	-
5	Alstonia scholaris .R	Apocynaceae	-	+	+	+	-	+	-	+	-	-	+	+	-	-	+	+	-	-	+	+	-
6	Nerium indicum.L	Apocynaceae	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	-	+	+	+	+	+
7	Plumera rubra.L	Apocynaceae	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	+	+
8	Tabernaemontana divaricataR.B	Apocynaceae	+	+	+	+	+	-	-	+	+	+	-	-	+	+	-	-	-	-	-	-	-
9	Thevetia peruvinia.L	Apocynaceae	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	-
10	Caryota urens.L	Arecaceae	-	-	-	-	+	-	-	-	-	-	-	-	+	+	-	-	+	-	-	-	-
11	Cocos nucifera.L	Arecaceae	-	-	-	+	-	-	-	+	+	-	-	+	+	+	+	+	+	+	+	+	+
12	Dypsis lutenscens.L	Arecaceae	-	-	-	-	-	+	-	-	-	-	+	-	+	-	+	+	+	-	-	-	-
13	Hyophorbe	Arecaceae	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	-	-	-	-
14	Roystonea regia.L	Arecaceae	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	+	-	-	-	-
15	Agave americana.L	Asparagaceae(Agavoideae)	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-
16	Kigelia pinnata.DC	Bignoniaceae	-	-	-	-	-	-	-	-	+	-	-	+	+	-	+	-	-	+	+	+	+
17	Millingtonia	Bignoniaceae	-	+	-	-	-	-	-	-	+	-	+	+	+	+	+	+	+	+	+	+	-
18	Ticoma stans.L	Biognoniaceae	-	-	-	-	+	-	-	+	-	-	+	+	-	-	+	-	+	-	-	+	+
19	Cordia dichtama.L	Boraginaceae	-	-	-	-	+	+	-	-	+	-	+	+	-	-	-	-	-	-	+	+	-
20	Ceasalpinia pulcherrima.L	Caesalpiniaceae	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
21	Delonix regia.L	Caesalpiniace	+	+	+	-	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+
22	Hardwickia binate.L	Caesalpiniace	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
23	Phanera purpurea.L	Caesalpiniace	-	-	-	-	+	+	+	+	-	-	+	+	-	+	-	+	+	+	+	+	+
24	Peltophorum petrocarpum.Dc.	Caesalpiniaceae	-	+	+	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+
25	Tamarandus indica.L	Caesalpiniace	-	-	-	-	-	-	-	-	-	+	+	-	+	+	-	+	+	+	-	+	+
26	Carica papaya.L	Caricaceae	+	-	-	-	-	+	-	-	-	-	+	+	+	-	+	-	+	+	+	+	+
27	Casaurina	Casurinaceae	-	+	-	-	-	-	-	+	+	-	-	-	-	-	-	+	+	+	-	-	-
28	Mesua ferrea.L	Calophyllacea	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-
29	Quisaqualis indica.L	Combreteacea	-	-	-	-	-	-	-	+	+	+	-	+	+	-	-	-	-	+	-	-	+
30	Terminalia cattapa.L	Combreteacea	-	+	-	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
31	Emblica officinalis.L	Euphorbiaceae	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	+	-
32	Ricinus communis.L	Euphorbiaceae	+	-	-	-	+	-	-	-	-	+	+	+	+	-	+	+	+	+	+	+	+
33	Bauhinia racemosa.L	Fabaceae	-	-	-	-	-	-	-	-	+	-	-	+	+	-	+	+	-	+	-	-	-
34	Butea monosperma. L	Fabaceae	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	+	+
35	Cassia siamea L.	Fabaceae	+	+	+	-	+	+	-	+	-	-	+	+	-	+	+	+	+	+	+	+	+
36	Dalbergia sissoo.R	Fabaceae	+	-	+	-	-	+	-	-	+	-	-	+	+	+	+	-	-	-	+	+	-

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37	Pithecellobium dulce.Roxb	Fabaceae	+	+	+	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	+	+
38	Pongamia pinnata.L.	Fabaceae	-	+	-	-	-	+	-	-	-	+	+	+	+	-	-	-	+	-	+	+	+
39	Prosopis juliflora.DC	Fabaceae	+	+	-	-	-	-	+	+	-	-	+	+	-	+	+	+	+	+	+	+	+
40	Lawsonia inermi.L	Lythraceae	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
41	Punica granatum.L	Lythraceae	-	-	+	+	-	-	-	-	-	-	-	+	-	+	-	-	-	+	+	+	+
42	Bombax	Malvaceae	-	-	-	-	-	-	+	-	-	+	+	-	-	-	-	-	-	-	+	-	-
43	Ceiba pentandra.L	Malvaceae	-	-	-	-	-	-	-	-	+	-	+	+	+	+	-	-	-	-	-	-	-
44	Azadirachta indica. L	Meeliaceae	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
45	Melia azedaraha.L	Meeliaceae	-	-	-	+	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+
46	Acacia arabica. L	Mimosaceae	-	+	-	-	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+
47	Acacia catechu. L	Mimosaceae	-	-	+	-	-	-	-	-	-	+	+	+	-	+	+	+	+	+	+	+	+
48	Albizia lebbeck.L	Mimosaceae	-	-	-	-	+	+	-	+	+	+	+	+	+	+	+	+	+	-	+	+	+
49	Albiziasama.L	Mimosaceae	-	+	-	-	+	+	+	-	-	+	+	+	+	+	-	+	+	+	-	-	-
50	Leucaena	Mimosaceae	+	-	-	-	+	-	-	-	+	+	-	-	+	+	+	+	+	-	+	+	+
51	Ficus carica.L	Moraceae	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-
52	Ficus racemose.L	Moraceae	+	-	+	-	+	-	+	+	-	+	+	+	+	+	-	-	-	-	+	-	+
53	Ficus religiosa .L	Moraceae	+	-	+	+	+	-	+	-	+	-	+	+	+	+	+	+	-	-	+	+	+
54	Ficus urostigama.L	Moraceae	-	-	-	-	-	+	-	-	-	-	+	+	+	+	+	-	+	-	-	+	-
55	Morus alba.L	Moraceae	-	-	-	-	-	-	-	-	+	+	+	+	+	+	-	-	-	+	+	+	+
56	Moringa olifera.L	Moringaceae	-	-	-	-	-	-	-	+	+	+	+	+	-	-	+	+	-	+	+	+	+
57	Ravenala madagascariensis.L	Musaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
58	Callistemon citrinus.L	Myrtaceae	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
59	Eucalytus globulus.L	Myrtaceae	-	+	+	+	-	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+
60	Psidium guajava.L.	Myrtaceae	-	-	+	-	-	-	-	-	-	+	+	+	+	+	+	-	-	+	+	+	+
61	Syzygium cumini.L	Myrtaceae	-	+	-	-	+	-	-	-	+	+	+	+	-	+	+	-	-	+	+	+	+
62	Bougainvillea glabra.L	Nyctaginaceae	-	-	-	+	+	-	-	-	+	+	+	+	-	-	+	-	-	+	+	+	+
63	Jasminum sambac.L	Oleaceae	-	-	-	-	+	-	-	-	-	-	-	+	+	-	-	-	+	-	-	-	+
64	Bambusa	Poaceae	-	+	-	-	-	-	-	+	+	-	+	+	+	-	-	-	-	-	+	+	-
66	Citrus limo.L	Rutaceae	-	-	-	-	-	-	+	+	-	-	-	-	+	-	-	-	-	+	+	+	-
65	Limonia acidissima.L	Rutaceae	-	-	-	-	-	-	-	-	+	-	+	+	-	+	-	+	+	-	-	-	-
67	Murraya koenigii.L	Rutaceae	-	-	-	-	+	-	-	-	-	+	-	-	+	+	-	+	-	+	+	+	+
68	Prunus avium.L	Rosaceae	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	+	-
69	Ziziphus mavritiana.L	Rhamnaceae	-	-	+	-	-	-	-	+	-	+	+	+	+	+	+	+	-	+	+	+	+
70	Ailanthus	Simaroubacea	+	+	+	+	-	-	+	-	+	-	-	+	+	+	+	+	+	+	+	+	+
71	Tectona grandis.L	Verbenaceae.	-	-	+	-	+	-	-	-	+	-	+	+	+	+	+	+	+	+	+	+	+
Gymnosperm:-																							
72	Cycas beddomi	Cycadaceae	Present at Bhagya Nagar Corner, Chaufala, Maltekdi Railway Station									-	-	-	-	+	-	-	-	-	+	-
73	Thuja occidentalis	Cupressaceae	Present at Workshop Corner Road									+	+	+	-	-	-	-	-	-	+	-

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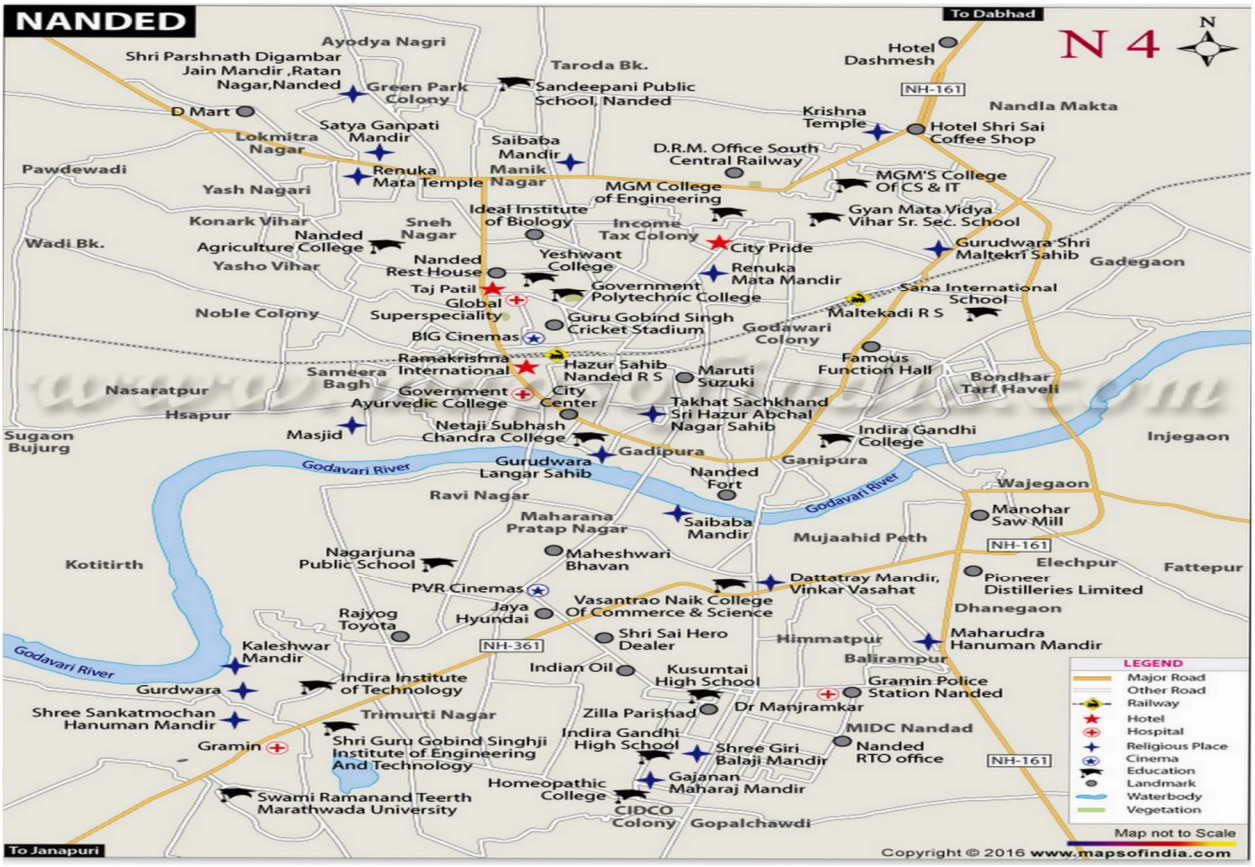


Figure 1: Road map of Nanded city (Source: Image obtained from Municipal Corporation, Nanded)

Table 2: Family, Genus and Species wise distribution of Plants

Sr.no	Family Name	Genus	Species	Sr.no	Family Name	Genus	Species
1	Anacardiaceae	1	1	16	Malvaceae	2	2
2	Annonaceae	2	3	17	Meeliaceae	1	2
3	Apocynaceae	5	5	18	Mimosaceae	3	5
4	Arecaceae	5	6	19	Moraceae	2	5
5	Asparagaceae	1	1	20	Moringaceae	1	1
6	Bignoniaceae	3	3	21	Musaceae	1	1
7	Boraginaceae	1	1	22	Myrtaceae	4	4
8	Caesalpiniaceae	6	6	23	Nyctaginaceae	1	1
9	Calophyllaceae	1	1	24	Oleaceae	1	1
10	Caricaceae	1	1	25	Poaceae	1	1
11	Casurinaceae	1	1	26	Rhamnaceae	1	1
12	Combreteaceae	2	2	27	Rosaceae	1	1
13	Euphorbiaceae	2	2	28	Rutaceae	3	3
14	Fabaceae	7	7	29	Simaroubaceae	1	1
15	Lythraceae	2	2	30	Verbenaceae.	1	1
Total						64	73

The plants from Sr. No 1 to 39 rarely observed, while plants from Sr. 40 to 64 are moderaly observed and plants from Sr. No. 65 to 73 are abundantly present in city area of Nanded. The less observed plants are Hardwickia binate L, Lawsonia inermi L., Ravenala madagascariensis L and most dominant plant is Azadirachta indica L. (See Fig. 4, Table 3)

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Table 3: Abundance of plants in different location of Nanded City

Sr. No.	Name of Plants	No. of Plants
1.	Hardwickia binate L	1
2.	Lawsonia inermi L	1
3.	Ravenala madagascariensis L	1
4.	Agave americana L	2
5.	Cycas beddomi	2
6.	Roystonea regia L	3
7.	Mesua ferrea L	3
8.	Ficus carica L	3
9.	Callistemon citrinus L	3
10.	Prunus avium L	3
11.	Plumera rubra L	4
12.	Caryota urens L	4
13.	Hyophorbe	4
14.	Emblica officinalis L	4
15.	Bombax	4
16.	Thuja occidentalis	4
17.	Annona reticulata L	5
18.	Butea monosperma	5
19.	Ceiba pentandra L	5
20.	Jasminum sambac L	5
21.	Dypsis lutenscens L	6
22.	Casaurina	6
23.	Bauhinia racemosa L	6
24.	Citrus limo L	6
25.	Limonia acidissima L	6
26.	Cordia dichtama L	7
27.	Quisaqualis indica L	7
28.	Kigelia pinnata DC	8
29.	Ticoma stans L	8
30.	Pithecellobium	8
31.	Punica granatum L	8
32.	Ficus urostigama L	8
33.	Bambusa	8
34.	Tamarandus indica L	9
35.	Murraya koenigii L	9
36.	Tabernaemontana divaricata R.B	10
37.	Dalbergia sissoo R	10
38.	Pongamia pinnata L.	10
39.	Morus alba L	10
40.	Alstonia scholaris R	11
41.	Carica papaya L	11
42.	Moringa olifera L	11
43.	Psidium guajava L.	11
44.	Bougainvillea	11
45.	Thevetia peruvinia.L	12
46.	Millingtonia	12

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47.	Melia azedaraha L	12
48.	Acacia catechu L	12
49.	Albizia sama L	12
50.	Leucaena	12
51.	Ficus racemose L	12
52.	Syzygium cumini L	12
53.	Annona squamosa L	13
54.	Nerium indicum L	13
55.	Cocos nucifera L	13
56.	Phanera purpurea L	13
57.	Ricinus communis L	13
58.	Ziziphus mavritiana L	13
59.	Mangifera indica L.	14
60.	Prosopis juliflora DC	14
61.	Tectona grandis L	14
62.	Polythenia longifolia Roxb	15
63.	Albizia lebbeck L	15
64.	Ficus religiosa L	15
65.	Cassia siamea L.	16
66.	Ailanthus	16
67.	Acacia arabica L	17
68.	Eucalytus globulus L	17
69.	Peltophorum petrocarpum Dc	18
70.	Terminalia cattapa L	18
71.	Ceasalpinia pulcherrima L	19
72.	Delonix regia L	19
73.	Azadirachta indica L	20



Fig. 2 Some of the plants present in city area of Nanded (N69, N70: *Jasminum sambac* (L.), N71, N72: *Bougainvillea glabra* (L.), N27, N28, N29, N30, N31, N32 N65, N66, N67, N68: *Peltophorum petrocarpum* (Dc.)

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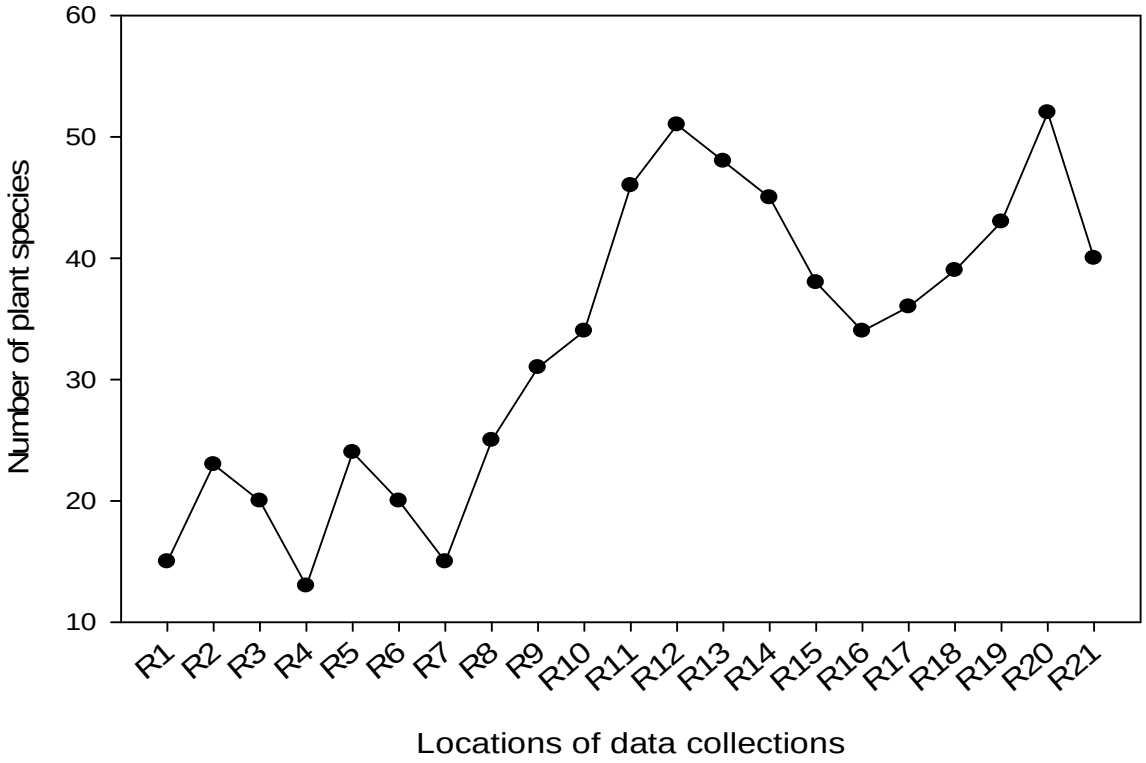


Figure 3: Number of plants observed in different locations of Nanded City.

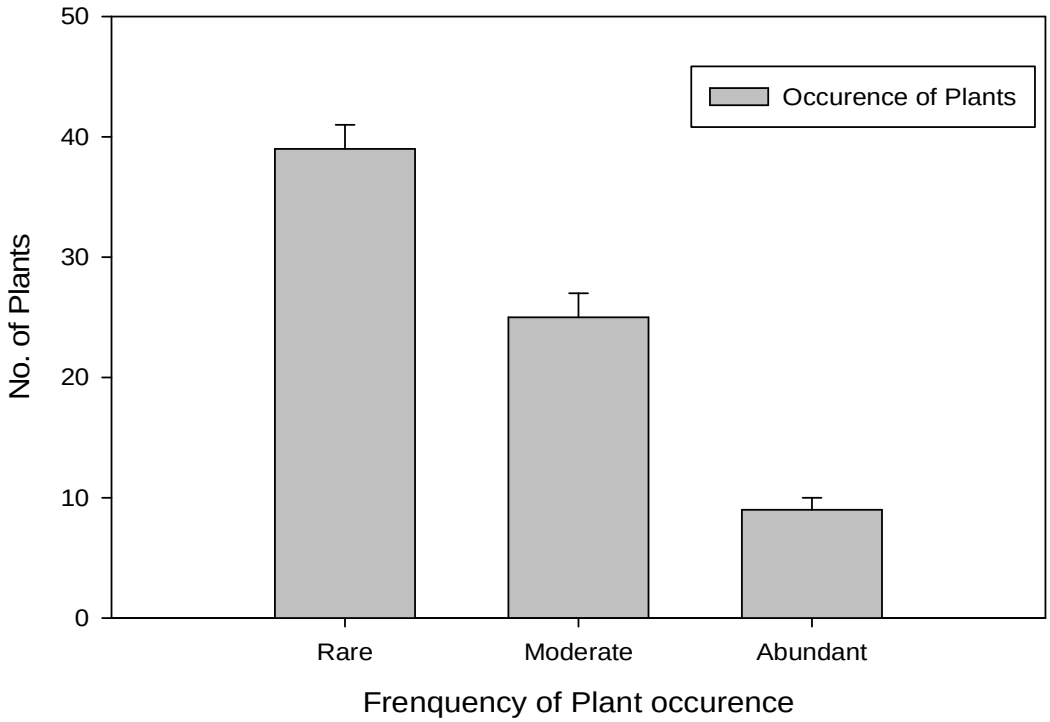


Figure 4: Frequency of occurrence of number of plants in different locations of Nande City.

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IV. DIVERSITY INDICES

Diversity indices were calculated manually and compared with standard software (Microsoft Excel), and we found that Jaccard's coefficient was 0.06, Margalef index was 11.099. For further easy calculations of collected sample data were distributed in two sets (Set 1 and Set 2) and diversity indices calculated. Set 1 and Set 2 composed of data (R1-R11) and (R12-R21) respectively. In Set 1 we found that, Berger Parker Index (17.3 %), Shannon-Weiner (2.3288), and Simpson Dominance (10.4 %). In case of Set 2, Berger Parker Index (12.2 %), Shannon-Weiner index (2.2929) and Simpson Dominance (10.2). Comparatively these set having similar value for Simpson Dominance (Table 4).

Table 4: Statistical analysis of vegetation data collected from different locations of Nanded City.

Diversity Indices for Set 1		Diversity Indices for Set 2	
Index	Value	Index	Value
Number of Classes *N*	11	Number of Classes *N*	10
Richness *R*	11	Richness *R*	10
Berger Parker Index p_{imax}	17.3%	Berger Parker Index p_{imax}	12.2%
Shannon-Weiner *H* (nat)	2.3288	Shannon-Weiner *H* (nat)	2.2929
Shannon-Weiner *H* (bit)	3.3598	Shannon-Weiner *H* (bit)	3.3080
Number Eq. ^1D (True Diversity)	10.3	Number Eq. ^1D (True Diversity)	9.9
Shannon Equitability *H*/ln*N*	97.1%	Shannon Equitability *H*/ln*N*	99.6%
Simpson Dominance *SD*	10.4%	Simpson Dominance *SD*	10.2%
SD (unbiased - finite samples)	10.1%	*SD* (unbiased - finite samples)	10.0%
True Diversity ^2D (Order 2)	9.6	True Diversity ^2D (Order 2)	9.8
Gini-Simpson Index 1-*SD*	89.6%	Gini-Simpson Index 1-*SD*	89.8%
Gini-Simpson Equitability	98.5%	Gini-Simpson Equitability	99.8%

The Nanded city located on south west region of Maharashtra state (India) lies on bank of Godavari River with geographical co-ordinates of 19˚ 15" north latitude and 77˚ 30" east longitudes (See Fig. 1). Nanded district has major biodiversity region with dark forest range of Kinwat, Bhokar, Himayatnagar and Mahur comes under Maharashtra Forest Department (MFD). Our main aim was to provide list of avenue trees including shrubs and trees present at road side of the chosen site as this has been less focus region towards avenue trees. Information obtained in this study is much concerned towards diversity study of Nanded city. In this study we found that sum total of 73 species of plants were present which belongs to 64 genera of 30 families spread over 21 road side locations. A major group of plants belongs to division dicotyledonous, while less number of species belongs to division monocotyledonous (See Fig. 2). Dominant species recorded were *Azadirachta indica* (L.), *Terminalia cattapa* (L.), *Alstonia scholaris* (L.), *Delonix regia* (L.), *Peltophorum petrocarpum* (Dc.), *Ailanthus excelsa* (Roxb.) and single species of tree *Hardwickia binata* (Roxb.) found at office of the Forest Department, Chikalwadi (See Table 1). We found that very rare plantation of gymnosperms in this area.

V. DISCUSSION

Purpose of avenue tree, is to provide sort of shelter in hot summer in the form of natural shade. Along with this, Avenue trees also plays major role in reduction of sound and air pollution, prevention of water evaporation and soil erosion (Mitra *et. al.*, 2012). Plantation is always beneficial to human beings as plants are natural resource of timber, fruits and secondary metabolites and helps in purification of air and mitigate adverse effect of sound pollution. Modern urbanization targeting mainly to forest areas for the construction and developments which leads to reduction in regions comes under landscape and forestry. Trees are having high importance to existence of human being, even though trees are vanishing faster than we think. People should make aware of conserving biodiversity for sustainable future. Healthy forest is the habitat of many important animals of food web and deforestation leads to their extinction. Anthropological activities (e.g. road expansion, clearance of electric line, constructions, etc.) are responsible for massive deforestation.

This investigation helps local people to make aware towards more and more plantation of new varieties of plants. Mulani and Khan (2016) reported 51 species in belongs to 25 families. Also Rao *et. al.*, (2015) reported 110 species belongs to 82 genera of 40 families in Khamman district, Telangana state, India.

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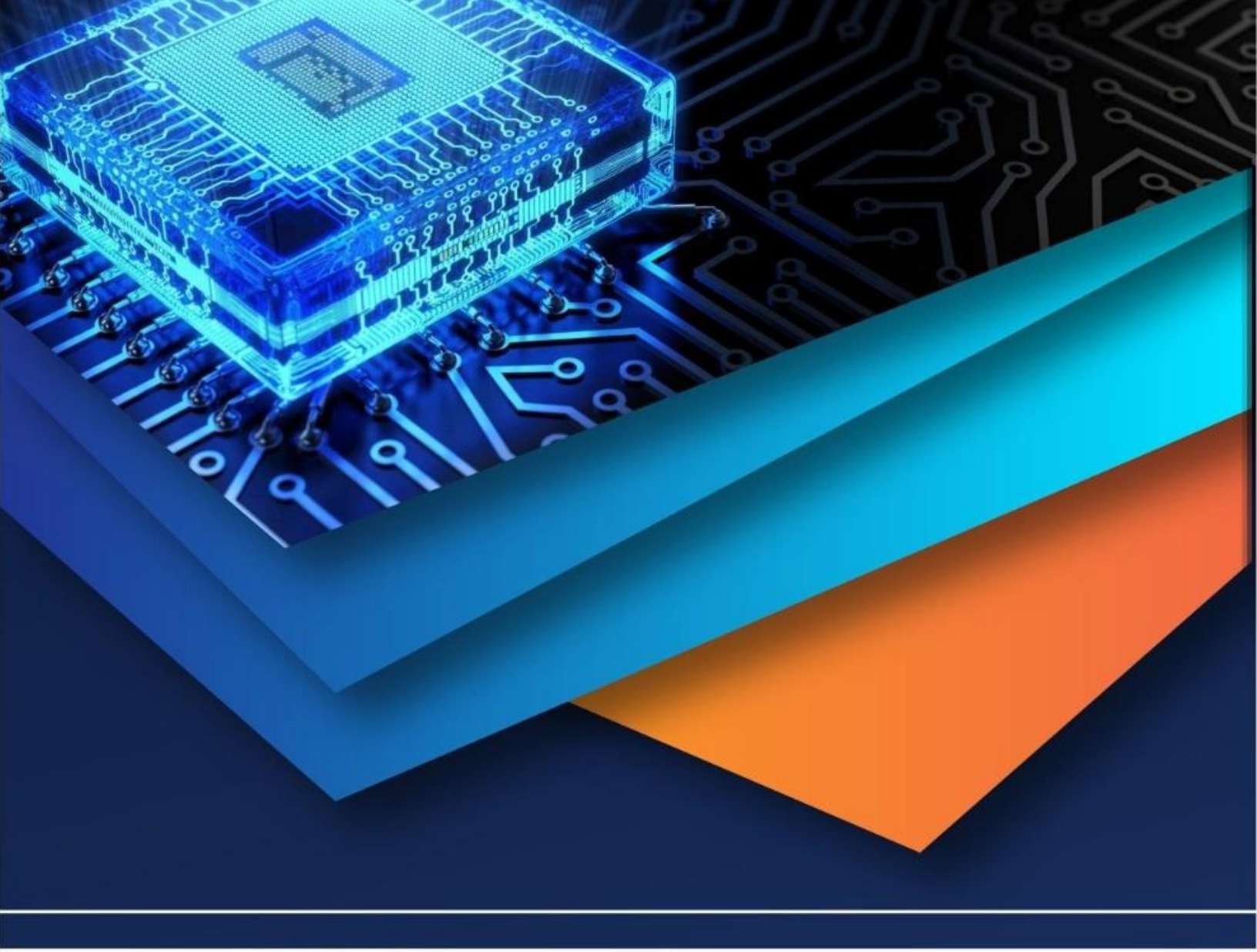
VI. CONCLUSION

From this we can conclude that, same sort tree plantation are done in Nanded city, may be of random selection of same division of plants or may be of unavailability of plants of other divisions. Growing more number of trees in city area soothes several problems of human beings and makes urban area more eco-friendly. Management and re-establishment of urban green space with respect to avenue tree is a vital portion need to be improvised towards ecological concerns. Assessment and monitoring of tree plantations are needed with more affected area with pollutions. During this study we found that in the city area of Nanded, there is most of locations were land is available (e.g. Barky chowk to old mondha and tarasingh market) for plantations and are more prone to pollutions. Such places should be occupied with more and more trees and shrubs, needs to be monitored through proper management.

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