

ASSESSMENT OF PLANT DIVERSITY AND SOIL QUALITY MANAGEMENT IN FOREST LAND OF WEST GODAVARI DISTRICT, ANDHRA PRADESH (INDIA)

Abstract

The field experiment was set in home-garden areas under forest land of eight small towns viz. Borampalem, Venkatapuram, Gundugolanukunta, Ramannapalem, Abdullapuram, Tirumaladevpeta, Venkatakrishnapuram, Appalarajugudem in West Godavari, Andhra Pradesh during November to March in 2021–22 to assess the Plant and Tree Diversity and Soil Quality parameters. The plant/tree species *Phoenix sylvestris*, reported the highest frequency (245.00), dominance (3.27), and basal area (7542.96 cm²). *Plumbago zeylanica* had the highest relative density (6.96) and relative abundance (6.81) among all the shrub species. *Plumbago zeylanica* reported the highest IVI (17.10) while Herb species with highest density was found in *Cenetella asiatica* (0.95), frequency (35), and highest IVI (14.60). Soil quality parameters reflect that at the depth 0-15cm the average value of pH is found to be 7.52, organic carbon is 0.56%, the amount of available nitrogen is 213.78 kg/ha, amount of available phosphorus is 41.25 kg/ha and available potassium is 38.22 kg/ha. At the depth of 15-30 cm the Average value of pH is found to be 6.61, organic carbon is 0.39%, the amount of available nitrogen is 189.51 kg/ha, amount of available phosphorus is 34.75 kg/ha and available potassium is 31.37 kg/h.

Keywords: Agro-forestry models, Forest land, Plant and Tree diversity, Soil quality, Relative Density, West Godavari District.

INTRODUCTION:

Since trees make up a significant portion of the vegetation, it is vital to continuously monitor and manage them to ensure that the diversity of species and habitats is maintained through successional processes (Turner 1987; Attua and Pabi 2013). Diversity in tree species is essential to tropical forest biodiversity (Evariste et al., 2010) and a significant component of forest ecosystem diversity (Rennolls and Laumonier, 2000; Tchouto et al., 2006). To track the dynamics of tropical forests over time and evaluate the impact of disturbance and climate change on plant demography, tree census plots have been set up in a variety of forest types (Condit et al 1996; Laurance et al 2004; Mohandass and Davidar 2009). The diversity of tree species affects the climate, stand structure, species composition, and geomorphology of the forest. Understanding the structure of forest stands is crucial for understanding forest ecosystems, since it plays a significant role in the biodiversity of stands (Ozcelik 2009). Our capacity to maximize biodiversity conservation as a result of deforestation and degradation will be strengthened by an immediate inventory of tree species that offers information on diversity (Baraloto et al 2013). Plant species diversity is complex in nature, and its structure and composition vary depending on climatic conditions and topography (Raturi 2012). Tropical forests are the most complex of all terrestrial ecosystems and the most heavily exploited ecosystems in the biosphere (Bahuguna 1999). It only accounts for 7% of the earth's land surface yet is

home to more than half of the world's plant and animal variety (Wilson 1988). Despite their direct benefits to human survival, they are disappearing at a rate of 0.8 to 2% every year (May & Stumpf 2000, Sagar et al. 2003), and dry deciduous forests in particular are the most damaged and least protected ecosystems on the planet (Murphy & Lugo 1986). Biodiversity is still declining despite a national policy focused at preserving and enhancing nature. The rapid decline of tropical forests worldwide has been accelerated by habitat destruction, deforestation, human settlements, globalization, agricultural expansion, and other development-related infrastructure over the last century. These factors have adversely affected biodiversity, climate change, ecological services, soil productivity, and the livelihoods of both forest dwellers and those living in rural areas (Myers 1992, Raghubanshi & Tripathi 2009). Considering the importance of plant diversity and their role in improvement of soil quality parameters, present study was conducted and findings were presented in this paper.

MATERIALS AND METHODS

Experimental areas are situated on the southeast coast of the nation, alongside the Bay of Bengal, is Andhra Pradesh, the eighth largest state in the nation. The State's geographical area is 1,62,968 square kilometers, or 4.96% of the nation's total area. One of Andhra Pradesh's most significant districts, the West Godavari, is located between 16° 15' 00" and 17° 30' 00" of north latitude and between 80° 50' 00" and 81° 55' 00" of east longitude. It covers an area of 8506 sq. km with a coastline that is roughly 23.00 km.

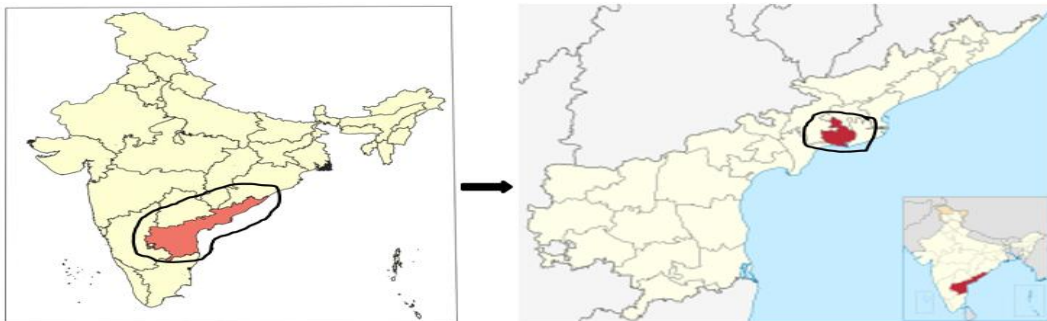


Fig1: Experimental areas of West Godavari district, Andhra Pradesh

Analysis of the plant and tree diversity and Analysis of data

Quadrat methods used for collection of data for analysis of parameter of plant and tree diversity. In this species are enumerated within random quadrat of different size as per on the size and nature of plant community. 10m, x10m., 5mX5m and 1mx1m for trees, shrubs and herbs respectively were laid out at selective sites. Nearly all types of vegetation can be quantified using the quadrat approach to determine the plant community. The numbers and names of each plant recorded when the sample pits are created. The frequency, density, and dominance of the flora were then determined and evaluated by formula suggested by Curtis and McIntosh 1950. The important value index, relative density, relative dominance, and relative frequency were analysed using formula suggested by Philips 1959. The following formulas were used to determine frequency, density, and dominance.

$$\text{Density} = \frac{\text{Total number of individuals of the species}}{\text{Total number of sample units studied}}$$

$$\text{Frequency} = \frac{\text{Number of sample plots in which species occurred}}{\text{Total number of sample plots studied}} \times 100$$

$$\text{dominance} = \frac{\text{Total cover basal area}}{\text{Total area sampled}} \times 100$$

Basal area:

The area that a tree's base occupies is thought to be a reliable measure of the size, weight, or volume of the tree. The formula was used to determine the basal area.

$$BA = Cbh^2/4\pi,$$

where, Cbh = diameter measured at breast height

Important Value Index

A measure of a species' dominance in a particular study area is called an important value. Foresters use it as a common tool to inventory a forest. Instead of counting every tree in a forest, foresters typically identify key locations inside the forest and sample a predetermined area surrounding those locations. Relative frequency, relative density, and relative dominance are the three types of data that are gathered; each of these values is expressed as a percent and spans from 0 to 100. The sum of these three measurements is the significant value, which can be anywhere between 0 and 300.

The value of the Important Value Index (IVI) was 300. It covers three essential components.

$$\text{Relative Density} = \frac{\text{Total number of individuals of the species}}{\text{Total number of sample units studied}} \times 100$$

$$\text{Relative Frequency} = \frac{\text{Number of sample plots in which species occurred}}{\text{Total number of sample plots studied}} \times 100$$

$$\text{Relative dominance} = \frac{\text{Total cover basal area}}{\text{Total area sampled}} \times 100$$

Simpson's index (1949): It is calculated by a particular formula, which examines the species dominance of a specific area of study:

$$Cd = \pi(n_i/N)^2$$

n_i = Total number of the individuals in each species

N = Total number of the individuals of all species

Shannon–wiener index (1963): Whenever assessing the species diversity within a community, the Shannon-Weiner index (H) is often utilised. Shannon's Index takes into consideration the evenness and richness of the species that are there. It's calculated by using this formula.

$$H = -\sum (n_i/N) \log(n_i/N)$$

n_i = The overall number of individuals in the collective that belong in the i^{th} species

Soil sample analysis

Eight locations in the West Godavari District provided soil samples, which have been gathered for physical-chemical research at depths of 0–15 cm and 15–30 cm. After the samples were correctly mixed, let to air dry, crushed, and sieved through a 2-mm screen to remove any remaining foreign material, the samples were stored in preparation for their physical and chemical analysis. The mechanical characteristic of the soil is determined by using Bouyoucos Hydrometer method (1965) and physical property is done by cylindrical methods (Muthuvel *et al.* 1992). Soil parameter analysed for pH and EC dSm⁻² at 25° C or mmho/m at 25° C) % organic carbon, available N kg/ha, P₂O₅ kg/ha, K₂O kg/ha).

Chart 1. Physio–Chemical properties of the Soil

S.No.	Parameter	Method	Reference
1	pH	Digital pH meter	Jackson, 1973
2	EC	Method no.4 USDA Handbook no.16	Richards, 1954
3	Organic Carbon	Walkley and Blackman Method	Walkley and Black 1947
4	Available Nitrogen.	Alkaline pomegranate Method	Subbiah and asija, 1954
5	Available Phosphorous	Olsen's Colorimetric Method	Olsen's <i>et al.</i> 1994
6	Available Potassium	Flame Photometric Method	Toth and Prince, 1949

S.NO	Nameofplants	Total no. ofindividuals	Density	Frequency	BasalArea (cm ²)	Abundanc e	RelativeDe nsity	RelativeFreq uency	RelativeDom inance	IVI
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RESULTSANDDISCUSSION

Table 1 shows that 239 individuals in all, representing 41 tree species across 35 groups, were taken into consideration. Among all the species, *Phoenix sylvestris* (49) followed by *Salix babylonica*(14), *Tamarindus indica*(10), *Lanneacoromandelica*(8) reported the maximum number of individuals while *Azadirachta indica* (2), *Moringa oleifera* (3), reported with the least number of individuals was *Terminalia elliptica* reported the smallest basal area (314.16 cm²), while *Phoenix sylvestris* recorded the highest basal area (7542.96). *Phoenix sylvestris* was found to have the highest density (2.45) *Sterculia urens* has the smallest density (0.1). *Phoenix sylvestris* had the highest frequency (245.00), while *Sterculia urens* had the lowest frequency (10.00). *Phoenix sylvestris* has the highest Dominance (3.27), while *Sterculia urens* had the lowest (0.25). The relative density was highest in *Phoenix sylvestris* (20.33) followed by *Salix babylonica*(5.81) whereas the lowest was *Moringa oleifera* (0.83). The relative frequency was found to be the highest in *Phoenix sylvestris*(20.50) whereas the least was reported in *Moringa oleifera* (0.84). The species with the highest IVI was *Phoenix sylvestris* (50.25) whereas the least was *Terminalia elliptica*(2.89).

1.	<i>Azadirachta indica</i>	2	0.2	20	1385.44	1.33	1.66	1.67	1.73	5.06
2.	<i>Bombax cieba</i>	7	0.35	35	804.25	2.33	2.90	2.93	1.00	6.84
3.	<i>Ficus benghalensis</i>	6	0.3	30	1590.43	2.00	2.49	2.51	1.99	6.99
4.	<i>Mangifera indica</i>	4	0.2	20	490.87	1.33	1.66	1.67	0.61	3.95
5.	<i>Psidium guajava</i>	6	0.3	30	706.86	2.00	2.49	2.51	0.88	5.88
6.	<i>Prosopis cineraria</i>	3	0.15	15	490.87	1.00	1.24	1.26	0.61	3.11
7.	<i>Ficus religiosa</i>	6	0.3	30	1256.64	3.00	2.49	2.51	1.57	6.57
8.	<i>Tamarindus indica</i>	10	0.5	50	1134.11	2.00	4.15	4.18	1.42	9.75
9.	<i>Eucalyptus globulus</i>	3	0.15	15	3318.31	1.50	1.24	1.26	4.14	6.64
10.	<i>Elasis guinensis</i>	7	0.35	35	4417.86	1.75	2.90	2.93	5.52	11.35
11.	<i>Coccoloba nucifera</i>	4	0.2	20	1963.50	2.00	1.66	1.67	2.45	5.79
12.	<i>Phoenix sylvestris</i>	49	2.45	245	7542.96	3.27	20.3	20.50	9.42	50.25
13.	<i>Jasminum spp</i>	7	0.35	35	1590.43	1.75	2.90	2.93	1.99	7.82
14.	<i>Moringa oleifera</i>	2	0.1	10	1256.64	1.00	0.83	0.84	1.57	3.24
15.	<i>Indian mahogany</i>	4	0.2	20	3848.45	1.33	1.66	1.67	4.81	8.14
16.	<i>Terminalia arjuna</i>	4	0.2	20	1963.50	2.00	1.66	1.67	2.45	5.79
17.	<i>Shorea robusta</i>	4	0.2	20	4071.50	1.33	1.66	1.67	5.08	8.42
18.	<i>Delonix regia</i>	3	0.15	15	3318.31	1.50	1.24	1.26	4.14	6.64
19.	<i>Saraca asoca</i>	3	0.15	15	5026.55	1.50	1.24	1.26	6.28	8.78
20.	<i>Muraya koenigi</i>	6	0.3	20	1134.11	1.50	2.49	1.67	1.42	5.58
21.	<i>Leucaena leucocephala</i>	3	0.15	15	804.25	1.00	1.24	1.26	1.00	3.50
22.	<i>Terminalia catappa</i>	3	0.15	15	1385.44	1.00	1.24	1.26	1.73	4.23
23.	<i>Carica papaya</i>	6	0.3	30	1590.43	1.50	2.49	2.51	1.99	6.99
24.	<i>Anacardium occidentale</i>	4	0.2	20	1809.56	1.33	1.66	1.67	2.26	5.59
25.	<i>Acacia nilotica</i>	6	0.3	30	1075.21	1.50	2.49	2.51	1.34	6.34
26.	<i>Dalbergia latifolia</i>	3	0.15	15	2922.47	1.50	1.24	1.26	3.65	6.15
27.	<i>Phyllanthus emblica</i>	5	0.25	25	2290.22	1.25	2.07	2.09	2.86	7.03
28.	<i>Pongamia pinnata</i>	4	0.2	20	1590.43	2.00	1.66	1.67	1.99	5.32
29.	<i>Salix babylonica</i>	14	0.7	70	2827.43	2.33	5.81	5.86	3.53	15.20
30.	<i>Pterocarpus</i>	5	0.25	25	3848.45	1.25	2.07	2.09	4.81	8.97
31.	<i>Terminalia bellirica</i>	4	0.2	20	706.86	1.33	1.66	1.67	0.88	4.22
32.	<i>Wrightia tinctoria</i>	3	0.15	15	660.52	1.33	1.24	1.26	0.82	3.32
33.	<i>Sterculia aurens</i>	4	0.2	20	1963.50	0.25	1.66	1.67	2.45	5.79
34.	<i>Madhuca longifolia</i>	5	0.25	25	1452.20	0.29	2.07	2.09	1.81	5.98
35.	<i>Bauhinia racemosa</i>	6	0.3	30	1590.43	1.20	2.49	2.51	1.99	6.99
36.	<i>Senegalia chundra</i>	3	0.15	15	1075.21	1.00	1.24	1.26	1.34	3.84
37.	<i>Phyllanthus emblica</i>	3	0.15	15	660.52	1.00	1.24	1.26	0.82	3.32
38.	<i>Lannea coromandelica</i>	8	0.4	40	1017.88	1.33	3.32	3.35	1.27	7.94
39.	<i>Alstonia scholaris</i>	4	0.2	20	1734.94	2.00	1.66	1.67	2.17	5.50
40.	<i>Erythrina suberosa</i>	3	0.15	15	1452.20	1.50	1.24	1.26	1.81	4.31
41.	<i>Terminalia elliptica</i>	3	0.15	15	314.16	1.00	1.24	1.26	0.39	2.89
	Total	239	12.05	1195	80083.9	61.7	100	100	100	300

Table 1 Phyto-sociological analysis of trees in 8 villages of West Godavari District, at Andhra

Table 2 shows that a total number of 230 individuals belonging to 30 shrubs species and 19 families

reported in study areas. *Plumbago zeylanica* had the highest relative density (6.96) while *Carissa spinarum*, *Maytenusemarginata* had the least (1.30). The relative frequency was found to be highest in *Clerodendrum phlomides* (7.50), while it was lowest in *Carissa spinarum*, *Maytenusemarginata*, *Calotropis gigantea* (1.67). The relative abundance was highest in *Plumbago zeylanica* (6.81) while it was lowest in *Phyllanthus reticulatus* (2.38). *Plumbago zeylanica* reported the highest IVI (17.10), followed by *Clerodendrum phlomides* (16.24) whereas *Carissa spinarum* reported the least IVI (5.53).

Table 2 Phyto-sociological analysis of Shrubs in 8 villages of West Godavari District at Andhra Pradesh

S.NO	Name of plants	Total no of Individual	Density	Frequency	Basal Area	Abundance	Relative Density	Relative frequency	Relative dominance	IVI
1.	<i>Memecylonumbellatum</i>	14	0.7	35	283.5	2.0	6.09	5.83	3.41	15.3
2.	<i>Phyllanthusreticulatus</i>	7	0.35	25	153.9	1.4	3.04	4.17	2.38	9.59
3.	<i>Piperhooglandii</i>	10	0.5	25	254.5	2.0	4.35	4.17	3.41	11.9
4.	<i>Plumbagozeylanica</i>	16	0.8	20	113.1	4	6.96	3.33	6.81	17.1
5.	<i>Ricinuscommunis</i>	8	0.4	20	314.2	2.0	3.48	3.33	3.41	10.2
6.	<i>Sennaalata</i>	7	0.35	15	415.5	2.3	3.04	2.50	3.97	9.52
7.	<i>Vitexnegundo</i>	10	0.5	25	113.1	2	4.35	4.17	3.41	11.9
8.	<i>Woodfordiafruticosa</i>	7	0.35	15	572.6	2.3	3.04	2.50	3.97	9.52
9.	<i>Maytenusemarginata</i>	3	0.15	10	201.1	1.5	1.30	1.67	2.55	5.53
10.	<i>Acaciafarnesiana</i>	7	0.35	20	346.4	1.75	3.04	3.33	2.98	9.36
11.	<i>Azimatetracantha</i>	8	0.4	15	314.2	2.7	3.48	2.50	4.54	10.5
12.	<i>Balaniesroxburghii</i>	6	0.3	15	254.5	2	2.61	2.50	3.41	8.51
13.	<i>Bambusavulgaris</i>	6	0.3	20	452.4	1.5	2.61	3.33	2.55	8.50
14.	<i>Calotropisgigantea</i>	5	0.25	10	380.1	2.5	2.17	1.67	4.26	8.10
15.	<i>Canthiumparviflorum</i>	6	0.3	20	490.9	1.5	2.61	3.33	2.55	8.50
16.	<i>Capparisaphylla</i>	8	0.4	20	283.5	2.0	3.48	3.33	3.41	10.2
17.	<i>Cappariszeylanica</i>	6	0.3	20	346.4	1.5	2.61	3.33	2.55	8.50
18.	<i>Carissaspinarum</i>	3	0.15	10	415.5	1.5	1.30	1.67	2.55	5.53
19.	<i>Catunaregamspinosa</i>	7	0.35	20	283.5	1.75	3.04	3.33	2.98	9.36
20.	<i>Clerodendrumphlomides</i>	14	0.7	45	113.1	1.6	6.09	7.50	2.65	16.2
21.	<i>Dichrostachyscinerea</i>	5	0.25	10	452.4	2.50	2.17	1.67	4.26	8.10
22.	<i>Dodonaeeaviscosa</i>	6	0.3	20	201.1	1.5	2.61	3.33	2.55	8.50
23.	<i>Flacourtiaindica</i>	9	0.45	20	490.9	2.25	3.91	3.33	3.83	11.0
24.	<i>Gmelinaasiatica</i>	5	0.25	15	201.1	1.7	2.17	2.50	2.84	7.51
25.	<i>Helicteresisora</i>	12	0.6	35	572.6	1.7	5.22	5.83	2.92	13.9
26.	<i>Ixoraarborea</i>	7	0.35	20	346.4	1.8	3.04	3.33	2.98	9.36
27.	<i>Jatropha curcas</i>	7	0.35	20	254.5	1.75	3.04	3.33	2.98	9.36
28.	<i>Justiciaadhatoda</i>	6	0.3	15	254.5	2.0	2.61	2.50	3.41	8.51

29.	<i>Lantanacamar</i>	6	0.3	15	254.5	2	2.61	2.50	3.41	8.51
30.	<i>Lawsoniainermis</i>	9	0.45	25	314.2	1.8	3.91	4.17	3.07	11.1
31.	Total	230	11.5	60	9443.6	58.7	100	100	100	300

Table3 shows that a total number of 321 individuals belonging to 35 herb species and 25 families. *Cenetella asiatica* had the highest number of individuals (19) while the least was *Tephrosia purpurea* (2). *Cenetella asiatica* had the highest density (0.95) and *Tephrosia purpurea* had the lowest density (0.1). *Cenetella asiatica* (35) had the highest frequency, while *Commelinabenghalensis* had the lowest. *Withaniasomnifera*, *Tridax procumbens* (10). *Cenetella asiatica* reported the highest IVI (14.60) followed by *Indigoferatrita* (12.80) whereas *Tephrosiapurpurea* reported with the least IVI (3.35).

Table3. Phytosociological analyses of Herbs in 8 villages of West Godavari District of Andhra Pradesh

S.NO	Name of plants	Total no. of individual	Density	Frequency	Abundance	Relative Density	Relative Frequency	Relative Dominance	IVI
1.	<i>Cassitor</i>	8	0.4	15	2.7	2.49	2.46	2.89	7.85
2.	<i>Cenetella asiatica</i>	19	0.95	35	2.7	5.92	5.74	2.95	14.6
3.	<i>Cheilocostusspeciosus</i>	9	0.45	15	3	2.80	2.46	3.26	8.52
4.	<i>Cleomeviscosa</i>	11	0.55	20	2.75	3.43	3.28	2.98	9.69
5.	<i>Commelinabenghalensis</i>	5	0.25	10	2.5	1.56	1.64	2.71	5.91
6.	<i>Cyperusrotundus</i>	9	0.45	15	3	2.80	2.46	3.26	8.52
7.	<i>Dendrophthoefalcata</i>	10	0.5	20	2.5	3.12	3.28	2.71	9.11
8.	<i>Elytrariaacaulis</i>	12	0.6	20	3	3.74	3.28	3.26	10.2
9.	<i>Hygrophilauriculata</i>	9	0.45	15	3	2.80	2.46	3.26	8.52
10.	<i>Hyptissuovalens</i>	12	0.6	20	3	3.74	3.28	3.26	10.2
11.	<i>Indigoferatrita</i>	16	0.8	30	2.7	4.98	4.92	2.89	12.8
12.	<i>Martyniaannua</i>	8	0.4	15	2.7	2.49	2.46	2.89	7.85
13.	<i>Pentanema indicium</i>	7	0.35	20	1.75	2.18	3.28	1.90	7.36
14.	<i>Phylanodiflora</i>	12	0.6	20	3	3.74	3.28	3.26	10.2
15.	<i>Phyllanthusamarus</i>	6	0.3	15	2	1.87	2.46	2.17	6.50
16.	<i>Rauwolfiaserpentina</i>	7	0.35	15	2.3	2.18	2.46	2.53	7.17
17.	<i>Sennaobtusifolia</i>	3	0.15	10	1.5	0.93	1.64	1.63	4.20
18.	<i>sennaoccidentalis</i>	11	0.55	20	2.75	3.43	3.28	2.98	9.69
19.	<i>Sennator</i>	3	0.15	10	1.5	0.93	1.64	1.63	4.20
20.	<i>Sesamumalatum</i>	7	0.35	15	2.3	2.18	2.46	2.53	7.17
21.	<i>Tephrosiapurpurea</i>	2	0.1	10	1	0.62	1.64	1.09	3.35
22.	<i>Tridaxprocumbens</i>	7	0.35	10	3.5	2.18	1.64	3.80	7.62
23.	<i>Vandatessellate</i>	13	0.65	30	2.17	4.05	4.92	2.35	11.3
24.	<i>Withaniasomnifera</i>	9	0.45	10	4.5	2.80	1.64	4.88	9.33
25.	<i>Acalypha indica</i>	13	0.65	30	2.17	4.05	4.92	2.35	11.3
26.	<i>Achyranthusaspera</i>	11	0.55	15	3.7	3.43	2.46	3.98	9.87
27.	<i>Acoruscalamus</i>	10	0.5	20	2.5	3.12	3.28	2.71	9.11

28.	<i>Aervalanata</i>	5	0.25	15	1.67	1.56	2.46	1.81	5.83
29.	<i>Agavaamericana</i>	11	0.55	20	2.75	3.43	3.28	2.98	9.69
30.	<i>Anisomelesindica</i>	8	0.4	15	2.7	2.49	2.46	2.89	7.85
31.	<i>Argemonemexicana</i>	4	0.2	15	1.3	1.25	2.46	1.45	5.15
32.	<i>Bacopamomieri</i>	10	0.5	15	3.3	3.12	2.46	3.62	9.19
33.	<i>Biophyumsensitivum</i>	13	0.65	20	3.25	4.05	3.28	3.53	10.8
34.	<i>Bytmeriaberbaceae</i>	12	0.6	15	4	3.74	2.46	4.34	10.5
35.	<i>Xanthiumstrumarium</i>	9	0.45	15	3	2.80	2.46	3.26	8.52
36.	Total	321	16.0	610	92.1	100	100	100	300

Soil nutrient status

Table 4 Revealed that the chemical characteristics of various soil samples collected from the studied area is reported in the table1 and 2, respectively, at a depth of 0–15 and 15–30 cm. The chemical parameters are studied by the help of suitable methods. At the depth of 0-15 cm: The mean value of the organic carbon is (0.56%) which means the soil is comparatively fertile and good for the cultivation. The organic carbon is greater in the top soil due to continue mixing of leaf litters and high value of vegetation decomposition. The primary nutrient for vegetation growth and an important factor that determines the quality of the soil is nitrogen. The mean value of available Nitrogen in the soil is (213.78 kg/ha) which means that the nitrogen content in the soil is good enough. The mean value for the available Phosphorous is (41.25 kg/ha) it is quite low for that reason recommendable amount of SSP is to be used for the phosphorous. The mean value of the available potassium is (38.22 kg/ha) Potassium availability is generally low. The pH of study areas is slightly alkaline.

Table 4 Nutrient status of the soil sample at 0-15cm in WestGodavariDistrict of Andhra Pradesh

Name of the village	pH	EC(Ds/m)	Organic carbon (%)	N(kg/ha)	P(kg/ha)	K(kg/ha)
Borampallem	7.62	0.81	0.87	245.6	96	55.1
Venkatapuram	7.43	0.23	0.76	232.2	19	50
Gundugolanukunta	7.03	0.34	0.23	223.2	53	40.1
Ramannapalem	7.90	0.75	0.45	212.1	33	35.1
Abdullapuram	8.00	0.45	0.20	232.1	34	40.2
Tirumaladevipeta	7.24	0.29	0.81	152.1	20	35.1
Venkata krishnapuram	7.36	0.62	0.35	222.9	45	20.2
Appalarajugudem	7.62	0.55	0.81	190.1	30	30.0
Average	7.52	0.50	0.56	213.7	41.2	38.2

Soil analysis at the deep of 15-30cm

Table 5 revealed that as the organic carbon content in the deeper layer of soil (0.39%) was found to be lesser than top soil. Nitrogen content decrease with increases in soil depth and also due to decrease in the organic carbon the mean value of nitrogen at 15 – 30cm is (189.51 kg/ha). The same trends of decrease in available Phosphorous and Potassium (34.75 P kg/ha and 31.37 K kg/ha, respectively) was recorded with in soil depth. The decreased availability of organic matter in the soil's deeper layers may be the cause of its nutritional loss.

Table 5. Nutrient status of the soil sample at 15-30cm

Name of the village	pH	EC(Ds/m)	Organic carbon (%)	N(kg/ha)	P(kg/ha)	K(kg/ha)
Borampallem	6.36	0.7	0.80	230	85	49
Venkatapuram	7.2	0.15	0.61	220.1	15	45
Gundugolanukunta	6.7	0.3	0.18	190.1	50	30
Ramannapalem	6.24	0.71	0.39	180.2	31	25
Abdullapuram	6.66	0.42	0.10	200.2	25	35
Tirumaladevipeta	6.75	0.25	0.62	142.1	10	30
Venkata krishnapuram	6.5	0.59	0.32	170.9	40	15
Appalarajugudem	6.51	0.42	0.12	182.5	22	22
Avg	6.61	0.44	0.39	189.51	34.75	31.37

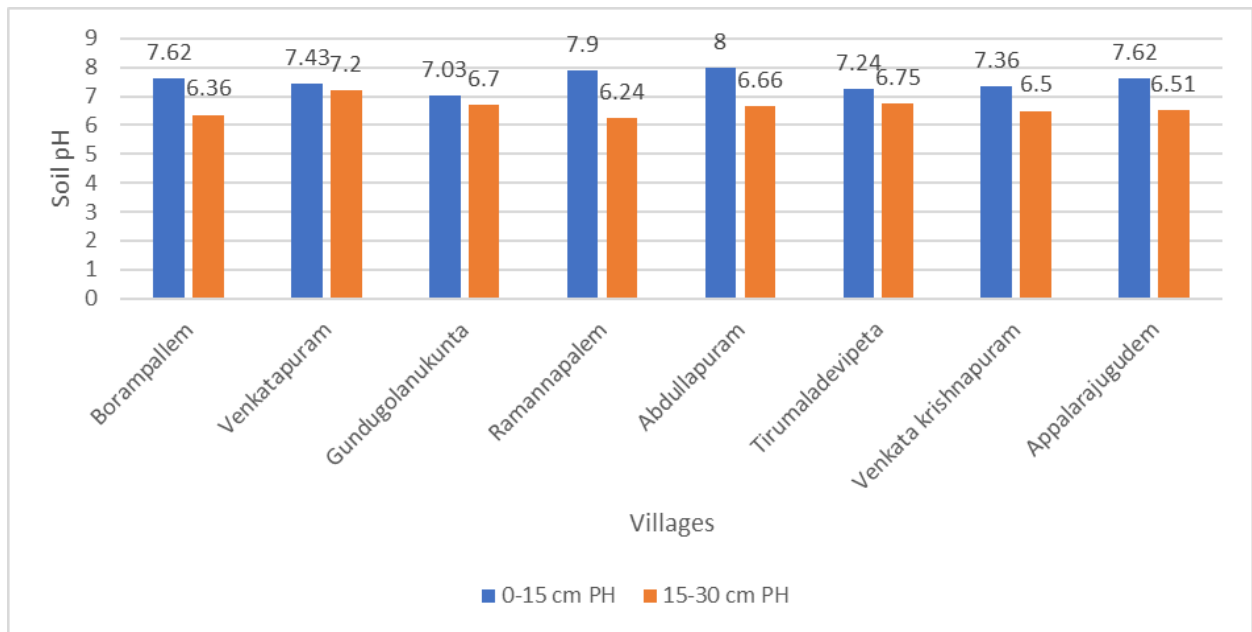


Fig.2pH of soil sample at 0-15cm and 15-30cm

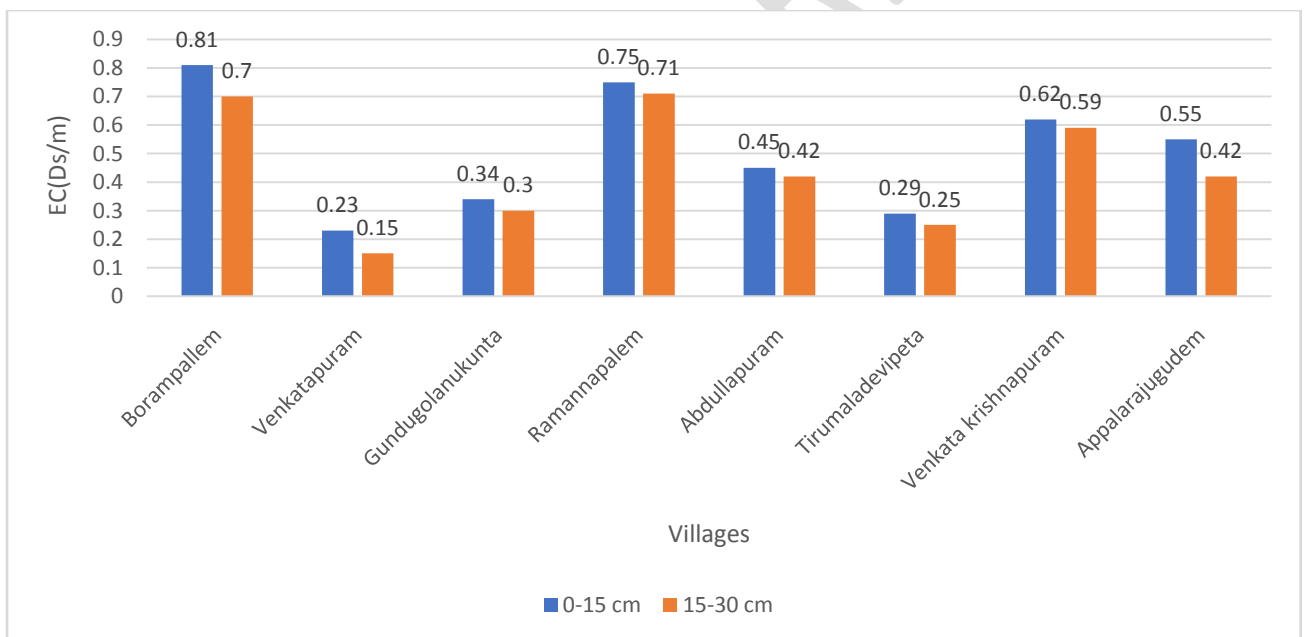


Fig.3Electrical conductivity of soil sample at 0-15cm and 15-30cm

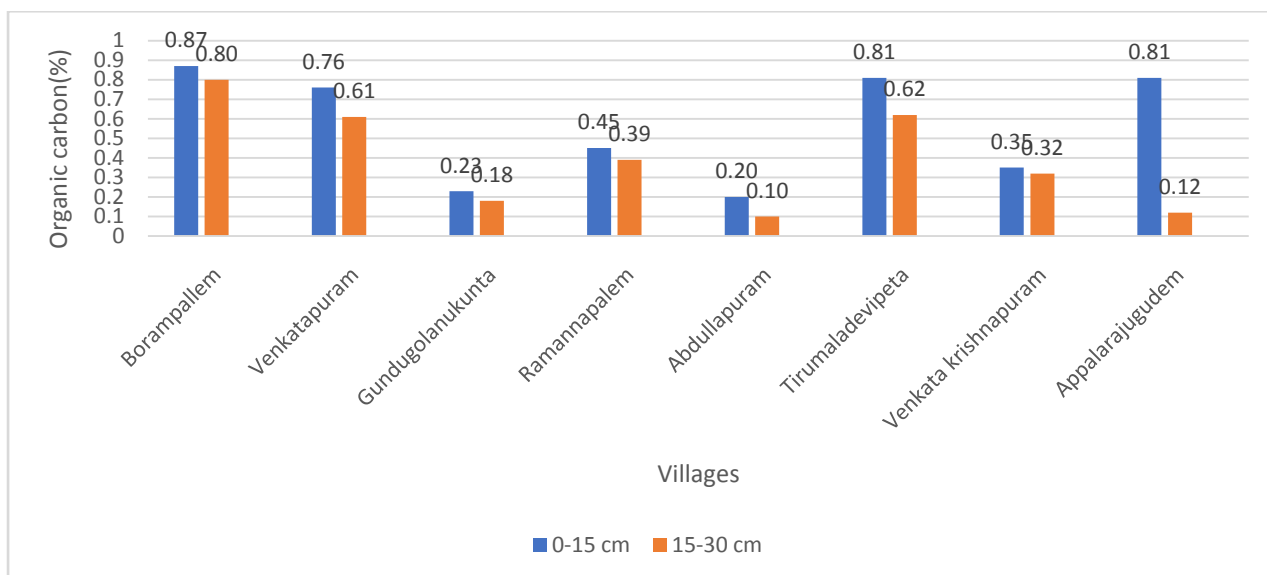


Fig.4 Organic carbon of soil sample at 0-15cm and 15-30cm



Fig.5 Nitrogen of soil sample at 0-15cm and 15-30cm

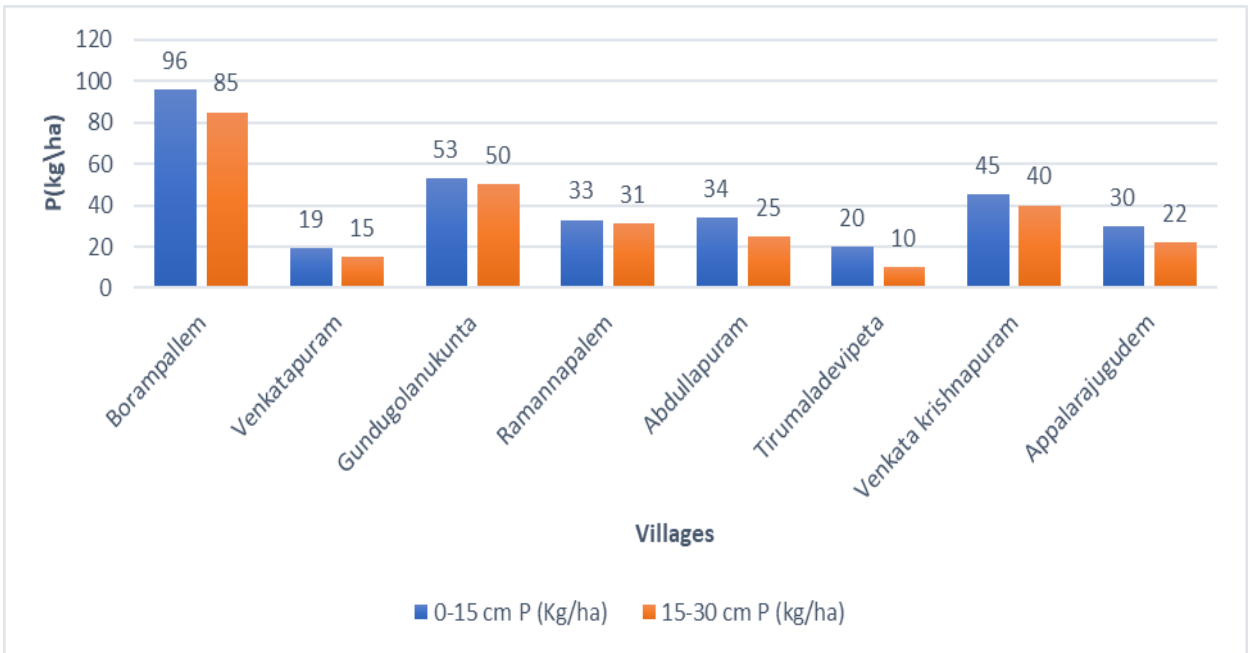


Fig.6 Phosphorus of soil sample at 0-15cm and 15-30cm

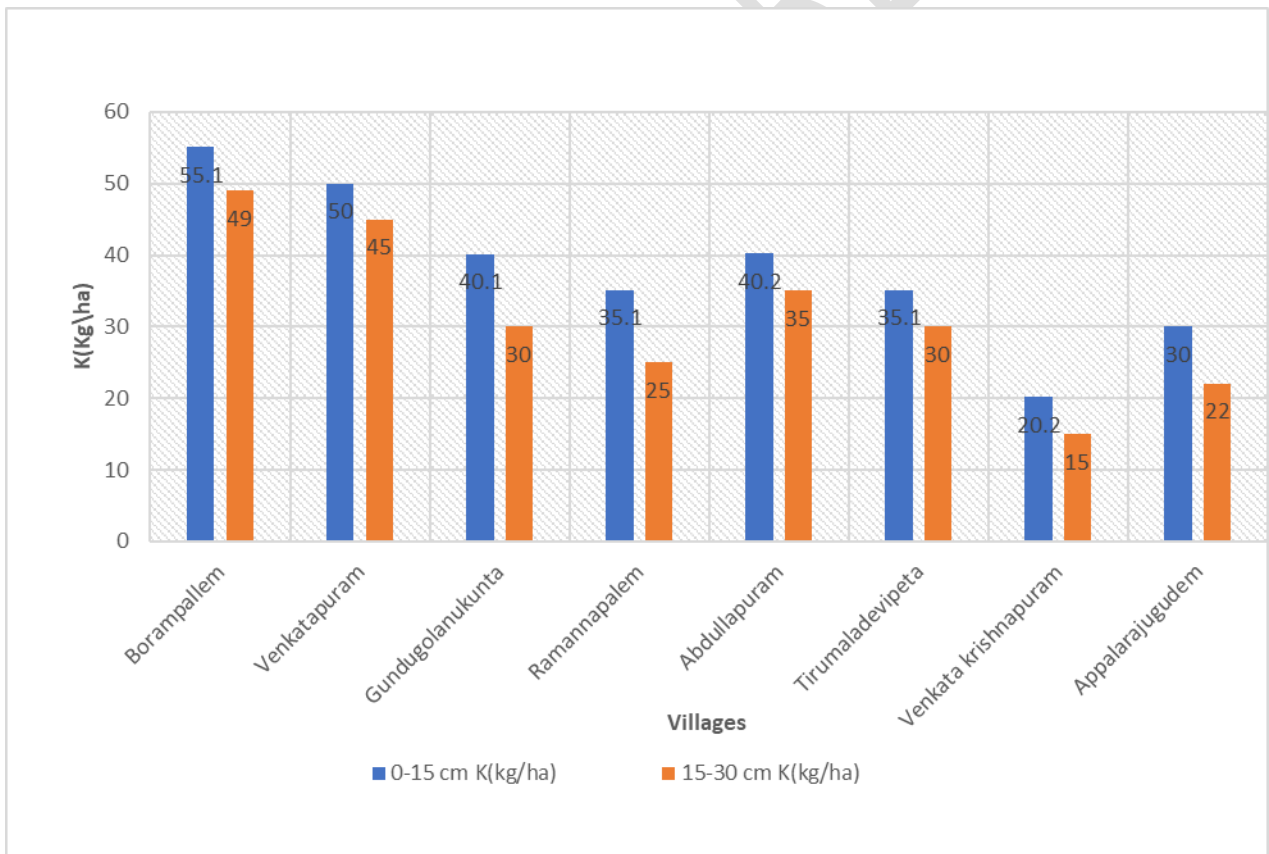


Fig.7. Potassium of soil sample at 0-15cm and 15-30cm

Conclusion:

Present research work concludes that villages of West Godavari district are mainly composed of 41 tree species belonging to 35 families. *Phoenix sylvestris* (7542.96) is the largest populous species with highest basal area, the highest density, frequency (245.00), and the highest dominance (3.27). Shrub species *Plumbago zeylanica* had the highest relative density (6.96), relative abundance (6.81) and the highest IVI (17.10). Herbs species with highest density was found for *Cenettella asiatica* (0.95), highest frequency (35) and highest IVI (14.60). The diversity of the study regions shows the disturbance due to soil quality variation, environmental factors and human intervention. As the soil nutrient status shows the remarkable low content of phosphorous and potassium. On the basis of questionnaire survey, it can be concluded that the compensation of diversity losses due to human activity in the study region can be achieved by adopting various Agro-forestry model by the farmers especially home garden.

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