ASSESSMENT OF PLANT DIVERSITY AND SOIL QULAITY MANAGEMENTIN FOREST LAND OF WESTGODAVARIDISTRICT,ANDHRAPRADESH(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, Appalarajugudemin West Godavari, Andhra Pradesh during November to March in 2021–22 assess the PlantandTreeDiversityandSoilquality parameters. The plant/tree species,Phoenix sylvestris, reported the highest frequency (245.00), dominance (3.27), and basal area (7542.96 cm^2). Plumbago zeylanica had the highest relative density (6.96) and relative abundance (6.81) among all the shrub species.Plumbago zeylanica reportedthehighestIVI (17.10) whileHerb species with highest density was found in Cenetella asiatica (0.95), frequency (35), and highest IVI (14.60). Soil quality parameters reflects that at the depth 0-15cm the average value of pH is found to be7.52, organic carbon is 0.56%, the amount of available nitrogen is 213.78 kg/ha, amount of available of 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 of 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, RelativeDensity,West GodavariDistrict.

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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 of forestecosystems, 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

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Comment [BC2]: Write all botanical names in italic font also check the spellings. It must *be Centella asiatica*

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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.

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MATERIALSANDMETHODS

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.

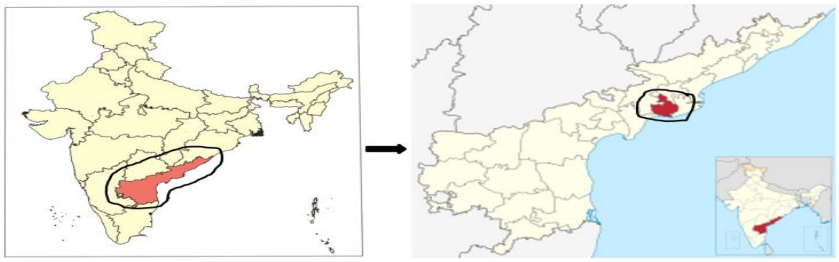

Fig1: Experimental areas of West Godavari district, AndhraPradesh

Analysisof theplantandtreediversity and Analysisofdata

Quadrate methods used for collection of data for analysis of parameter of plant and treediversity.In this speciesare enumeratedwithin random quadrate of different size as per onthe size and nature of plant community. 10mx10m., 5mX5m and 1mx1m for trees, shrubsandherbsrespectivelywerelaid outatselectivesites.Nearly all types of vegetation can be quantified using the quadrate 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 Curtish and McIntosh 1950. The important value index, relative density, relative dominance,

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and relative frequency were analysed using formula suggested by Philips 1959. The following formulas were used to determine frequency, density, and dominance.

$$\text{Density} = \frac{\text{Total number of individuals of the species}}{\text{Totalnumberofsampleunitstudied}}$$

$$\text{Frequency} = \frac{\text{Number of sample plots in which species occurred}}{\text{Totalnumberofsamplesplots studied}} X100$$

$$\text{dominance} = \frac{\text{Total cover basal area}}{\text{Totalareasampled}} X100$$

Basalarea:

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.

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

were,Cbh˝diameter measured at breast height

ImportantValueIndex

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.

$$\text{Relative Density} = \frac{\text{Total number of individuals of the species}}{\text{Totalnumberofsampleunitstudied}} X100$$

$$\text{Relative Frequency} = \frac{\text{Number of sample plots in which species occurred}}{\text{Totalnumberofsamplesplots studied}} X100$$

$$\text{Relative dominance} = \frac{\text{Total cover basal area}}{\text{Totalareasampled}} X100$$

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

$Cd=\pi(ni/N)^{\wedge}2$

ni = Total number of the individuals in each species

N=Totalnumber of the individuals ofall 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.

$$H=\Sigma(ni/N)\log(ni/N)$$

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

Soilsampleanalysis

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. ThemechanicalcharacteristicofthesoilsisdeterminedbyusingBouyoucousHydrometer method (1965) and physical property is done by cylindrical methods(Muthuvel *et al.* 1992). Soil parameter analysed for pH and EC dSm – 2 at25° C or mmho/m at 25° C) % organic carbon, available Nkg/ha, P_2O_5kg/ha,K_2O kg/ha).

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Chart 1. Physio–Chemicalpropertiesof theSoil

S.No.	Parameter	Method	Reference
1	pH	DigitalpHmeter	Jackson,1973
2	EC	Method no.4 USDA Handbookno.16	Richards,1954
3	OrganicCarbon	WalkleyandBlackman Method	Walkley and Black 1947
4	AvailableNitrogen.	Alkaline pomegranate Method	Subbiah and Asija, 1954
5	AvailablePhosphorous	Olsen's Colorimetric Method	Olsen's*et al.*1994
6		Flame Photometric	TothandPrince,1949

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S.NO	Nameofplants	Total no. ofindividuals	Density	Frequency	BasalArea (cm^2)	Abundance	RelativeDensity	RelativeFrequency	RelativeDominance	IVI

	AvailablePotassium	Method	

RESULTSANDDISCUSSION

Table 1 shows that 239 individuals in all, representing 41 tree species across 35 groups, were taken into consideration. Amongall the species, *Phoenix sylvestris (49)* followed by *Salix babylonica*(14), *Tamarindus indica*(10),*Lanneacoromandelica*(8)reportedthemaximumnumberofindividualswhile*Azadirachta indica* (2), *Moringa oleifera* (3), reported with the least number of individualswas Terminalia elliptica reported the smallest basal area (314.16 cm²), while Phoenix sylvestris recorded the highest basal area (7542.96). *Phoenix sylvestris* was found tohave the highest density (2.45) Sterculia urenshas 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 tobe the highestin*Phoenix sylvestris*(20.50) whereas theleastwasreportedin*Moringaoleifera* (0.84). The species with the highest IVI was *Phoenix sylvestris* (50.25) whereas theleastwas*Terminalia elliptica*(2.89).

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1.	*Azadirachtaindica*	2	0.2	20	1385.44	1.33	1.66	1.67	1.73	5.06
2.	*Bombaxcieba*	7	0.35	35	804.25	2.33	2.90	2.93	1.00	6.84
3.	*Ficusbenghalensis*	6	0.3	30	1590.43	2.00	2.49	2.51	1.99	6.99
4.	*Mangiferaindica*	4	0.2	20	490.87	1.33	1.66	1.67	0.61	3.95
5.	*Psidiumgujava*	6	0.3	30	706.86	2.00	2.49	2.51	0.88	5.88
6.	*Prosopis cineraria*	3	0.15	15	490.87	1.00	1.24	1.26	0.61	3.11
7.	*Ficusreligiosa*	6	0.3	30	1256.64	3.00	2.49	2.51	1.57	6.57
8.	*Tamarindusindica*	10	0.5	50	1134.11	2.00	4.15	4.18	1.42	9.75
9.	*Eucalyptusglobulus*	3	0.15	15	3318.31	1.50	1.24	1.26	4.14	6.64
10.	*Elasisguinansis*	7	0.35	35	4417.86	1.75	2.90	2.93	5.52	11.35
11.	*Cocusnucifera*	4	0.2	20	1963.50	2.00	1.66	1.67	2.45	5.79
12.	*Phoenixsylvestris*	49	2.45	245	7542.96	3.27	20.3	20.50	9.42	50.25
13.	*Jasminumspp*	7	0.35	35	1590.43	1.75	2.90	2.93	1.99	7.82
14.	*Moringaoleifera*	2	0.1	10	1256.64	1.00	0.83	0.84	1.57	3.24
15.	*Indianmahogany*	4	0.2	20	3848.45	1.33	1.66	1.67	4.81	8.14
16.	*Terminaliaarjuna*	4	0.2	20	1963.50	2.00	1.66	1.67	2.45	5.79
17.	*Shorearobusta*	4	0.2	20	4071.50	1.33	1.66	1.67	5.08	8.42
18.	*Delonixregia*	3	0.15	15	3318.31	1.50	1.24	1.26	4.14	6.64
19.	*Saracaasoca*	3	0.15	15	5026.55	1.50	1.24	1.26	6.28	8.78
20.	*Murayyakoenigi*	6	0.3	20	1134.11	1.50	2.49	1.67	1.42	5.58
21.	*Leucaenaleucocephala*	3	0.15	15	804.25	1.00	1.24	1.26	1.00	3.50
22.	*Terminaliacatappa*	3	0.15	15	1385.44	1.00	1.24	1.26	1.73	4.23
23.	*Caricapapaya*	6	0.3	30	1590.43	1.50	2.49	2.51	1.99	6.99
24.	*Anacardiumoccidentale*	4	0.2	20	1809.56	1.33	1.66	1.67	2.26	5.59
25.	*Acacianilotica*	6	0.3	30	1075.21	1.50	2.49	2.51	1.34	6.34
26.	*Dalbergialatifolia*	3	0.15	15	2922.47	1.50	1.24	1.26	3.65	6.15
27.	*Phyllanthusemblica*	5	0.25	25	2290.22	1.25	2.07	2.09	2.86	7.03
28.	*Pongamiapinnata*	4	0.2	20	1590.43	2.00	1.66	1.67	1.99	5.32
29.	*Salixbabylonica*	14	0.7	70	2827.43	2.33	5.81	5.86	3.53	15.20
30.	*Pterocarpus*	5	0.25	25	3848.45	1.25	2.07	2.09	4.81	8.97
31.	*Terminaliabellirica*	4	0.2	20	706.86	1.33	1.66	1.67	0.88	4.22
32.	*Wrightiatinctoria*	3	0.15	15	660.52	1.33	1.24	1.26	0.82	3.32
33.	*Sterculiaurens*	4	0.2	20	1963.50	0.25	1.66	1.67	2.45	5.79
34.	*Madhucalongifolia*	5	0.25	25	1452.20	0.29	2.07	2.09	1.81	5.98
35.	*Bauhiniaracemosa*	6	0.3	30	1590.43	1.20	2.49	2.51	1.99	6.99
36.	*Senegaliachundra*	3	0.15	15	1075.21	1.00	1.24	1.26	1.34	3.84
37.	*Phyllanthusemblica*	3	0.15	15	660.52	1.00	1.24	1.26	0.82	3.32
38.	*Lanneacoromandelica*	8	0.4	40	1017.88	1.33	3.32	3.35	1.27	7.94
39.	*Alstoniascholaris*	4	0.2	20	1734.94	2.00	1.66	1.67	2.17	5.50
40.	*Erytherinasuberosa*	3	0.15	15	1452.20	1.50	1.24	1.26	1.81	4.31
41.	*Terminaliaelliptica*	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**

Table1Phyto-sociological analysis of trees in 8villagesofWestGodavariDistrict, at Andhra

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

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reported in study areas. *Plumbago zeylanica* had the highest relative density (6.96) while *Carissa spinarum*, *Maytenusemarginata*had theleast (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 lowestin*Phyllanthusreticulatus*(2.38).*Plumbagozeylanica* reportedthehighestIVI(17.10),followed by *Clerodendrum phlomides*(16.24) whereas *Carissa spinarum*reported theleastIVI(5.53).

Table2Phyto-sociological analysis of Shrubsin 8villagesofWestGodavariDistrictat AndhraPradesh

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

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29.	*Lantanacamara*	6	0.3	15	254.5	2	2.61	2.50	3.41	8.51
30.	*Lawsoniainermis*	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 totalnumberof321individualsbelonging to 35herbsspeciesand25families.*Centellaasiatica*had the highest number of individuals (19) while theleastwas *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 Commelinabenghalensishad the lowest. *Withaniasomnifera, Tridax procumbens* (10).*Cenetellaasiatica*reportedthehighestIVI(14.60)followedby*Indigoferatrita*(12.80)whereas*Tephrosiapurp urea*reportedwith theleastIVI(3.35).

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Table3. Phytosociologicalanalyses ofHerbsin 8villagesofWestGodavariDistrict of Andhra Pradesh

S.NO	Nameofplants	Total no. ofindividual	Density	Frequency	Abundance	Relative Density	RelativeFrequency	RelativeDominance	IVI
1.	*Cassitora*	8	0.4	15	2.7	2.49	2.46	2.89	7.85
2.	*Cenetellaasiatica*	19	0.95	35	2.7	5.92	5.74	2.95	14.6
3.	*Cheilocosttusspeciosus*	9	0.45	15	3	2.80	2.46	3.26	8.52
4.	*Cleomeviscosa*	11	0.55	20	2.75	3.43	3.28	2.98	9.69
5.	*Commelinabenghalensis*	5	0.25	10	2.5	1.56	1.64	2.71	5.91
6.	*Cyperusrotundus*	9	0.45	15	3	2.80	2.46	3.26	8.52
7.	*Dendrophthoefalcata*	10	0.5	20	2.5	3.12	3.28	2.71	9.11
8.	*Elytrariaacaulis*	12	0.6	20	3	3.74	3.28	3.26	10.2
9.	*Hygrophilaauriculata*	9	0.45	15	3	2.80	2.46	3.26	8.52
10.	*Hyptissuovalens*	12	0.6	20	3	3.74	3.28	3.26	10.2
11.	*Indigoferatrita*	16	0.8	30	2.7	4.98	4.92	2.89	12.8
12.	*Martyniaannua*	8	0.4	15	2.7	2.49	2.46	2.89	7.85
13.	*Pentanemaindicium*	7	0.35	20	1.75	2.18	3.28	1.90	7.36
14.	*Phylanodiflora*	12	0.6	20	3	3.74	3.28	3.26	10.2
15.	*Phyllanthusamarus*	6	0.3	15	2	1.87	2.46	2.17	6.50
16.	*Rauvolfiaserpentina*	7	0.35	15	2.3	2.18	2.46	2.53	7.17
17.	*Sennaobtusifolia*	3	0.15	10	1.5	0.93	1.64	1.63	4.20
18.	*sennaoccidentalis*	11	0.55	20	2.75	3.43	3.28	2.98	9.69
19.	*Sennatora*	3	0.15	10	1.5	0.93	1.64	1.63	4.20
20.	*Sesamumalatum*	7	0.35	15	2.3	2.18	2.46	2.53	7.17
21.	*Tephrosiapurpurea*	2	0.1	10	1	0.62	1.64	1.09	3.35
22.	*Tridaxprocumbens*	7	0.35	10	3.5	2.18	1.64	3.80	7.62
23.	*Vandatessellate*	13	0.65	30	2.17	4.05	4.92	2.35	11.3
24.	*Withaniasomnifera*	9	0.45	10	4.5	2.80	1.64	4.88	9.33
25.	*Acalyphaindica*	13	0.65	30	2.17	4.05	4.92	2.35	11.3
26.	*Achyranthusaspera*	11	0.55	15	3.7	3.43	2.46	3.98	9.87
27.	*Acoruscalamus*	10	0.5	20	2.5	3.12	3.28	2.71	9.11

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28.	*Aervalanata*	5	0.25	15	1.67	1.56	2.46	1.81	5.83
29.	*Agavaamericana*	11	0.55	20	2.75	3.43	3.28	2.98	9.69
30.	*Anisomelesindica*	8	0.4	15	2.7	2.49	2.46	2.89	7.85
31.	*Argemonemexicana*	4	0.2	15	1.3	1.25	2.46	1.45	5.15
32.	*Bacopamonnieri*	10	0.5	15	3.3	3.12	2.46	3.62	9.19
33.	*Biophyumsensitivum*	13	0.65	20	3.25	4.05	3.28	3.53	10.8
34.	*Byttneriaberbaceae*	12	0.6	15	4	3.74	2.46	4.34	10.5
35.	*Xanthiumstrumarium*	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

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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**

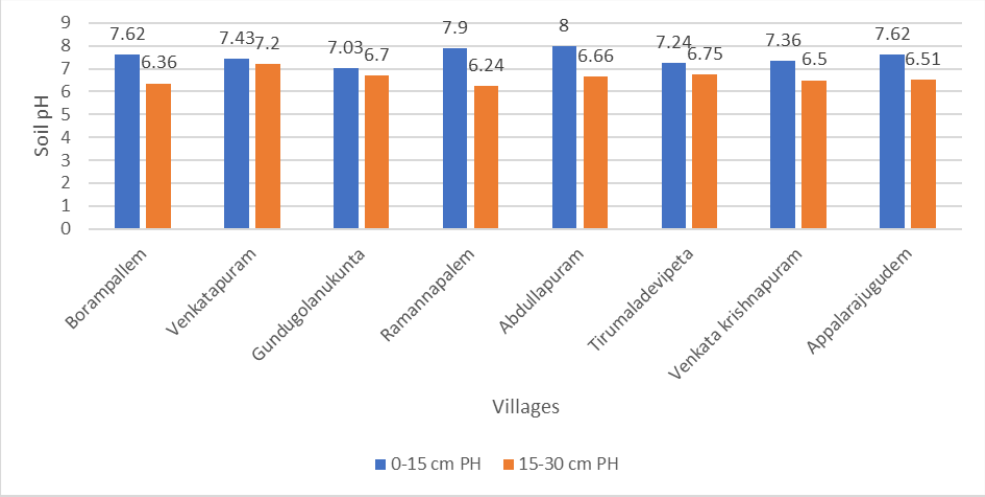

Fig.2pH of soil sample at 0-15cm and 15-30cm

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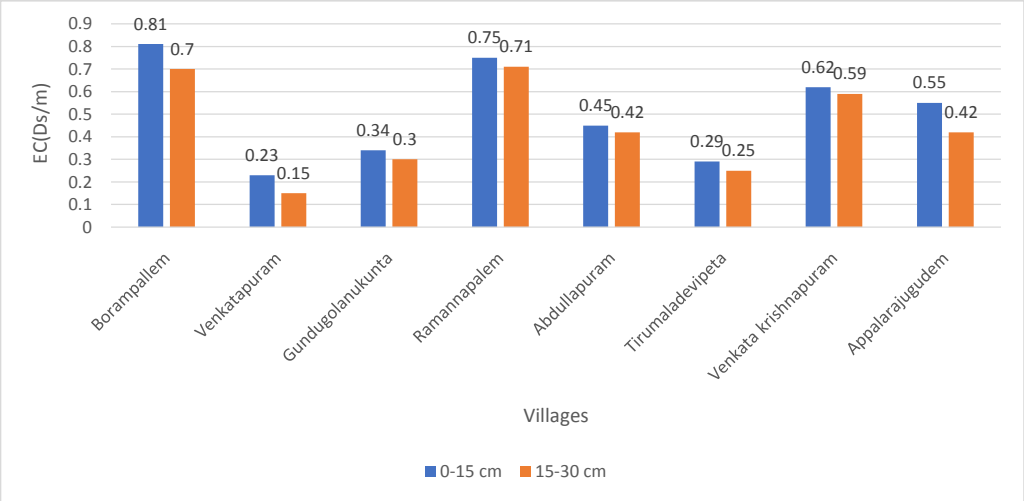

Fig.3Electrical conductivity of soil sample at 0-15cm and 15-30cm

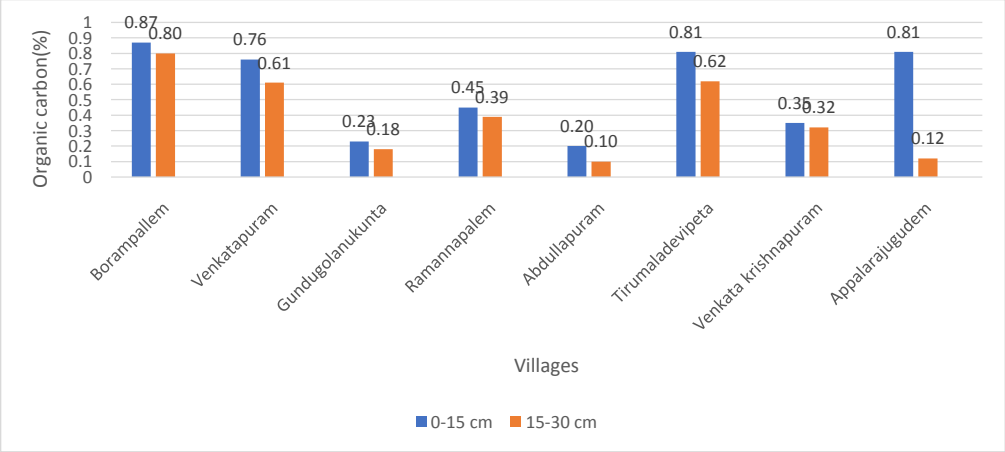

Fig.4Organic carbon of soil sample at 0-15cm and 15-30cm

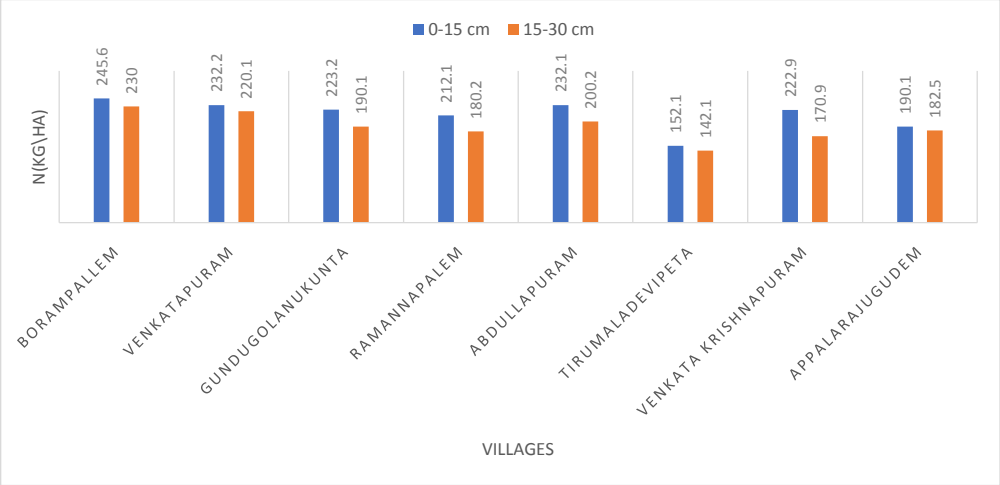

Fig.5Nitrogen of soil sample at 0-15cm and 15-30cm

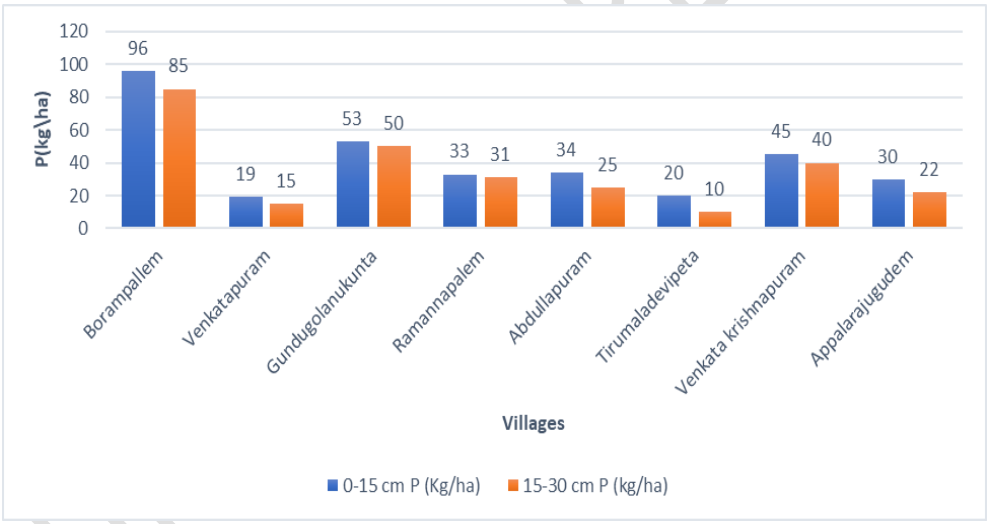

Fig.6Phosphorus of soil sample at 0-15cm and 15-30cm

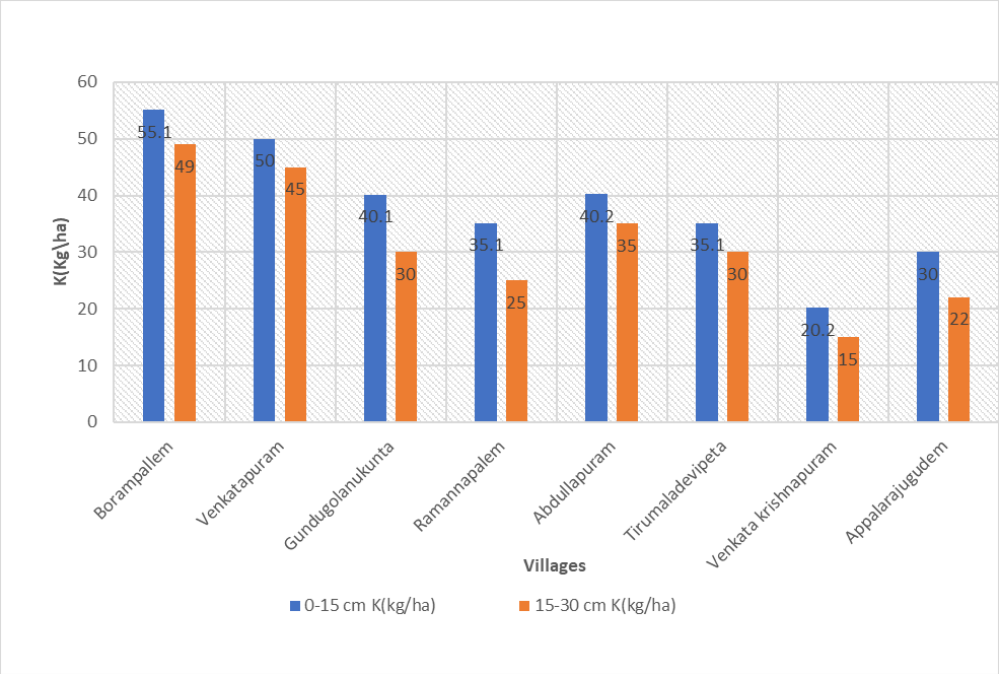

Fig.7. Potassium of soil sample at 0-15cm and 15-30cm

Conclusion:

Present research work concludes that villages of West Godavari district are mainlycomposed 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). Shrubsspecies *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*Cenetella asiatica* (0.95), highestfrequency(35) and highest IVI (14.60). The diversity of the study regionshowsthedisturbanceduetosoilqualityvariation,environmentalfactorsandhumanintervention. As the soil nutrient status shows the remarkable low content of phosphorous and potassium. Onthe basis of questionnaire survey, it can be concluded that the compensation of diversity losesdue to human activity in the study region can be achieved by adopting various Agro-forestrymodel bythe farmers especially home garden.

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