INTERNATIONAL JOURNAL OF PHARMACEUTICAL, CHEMICAL AND BIOLOGICAL SCIENCES

Available online at www.ijpcbs.com

Research Article

COMPARATIVE MINERAL PROFILE OF THE SELECTED TREE CANOPY SOIL

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ABSTRACT

Trees contribute significantly to the aesthetic beauty of cities, thereby helping to maintain the psychological health of the inhabitants. The most explosive urban growth is expected in India. In urban environments human alter these soil-forming factors by impacts associated with urban infrastructure. As a result of impacts associated with urban infrastructure, arborists and urban landscape managers perform remedial management actions to make urban soils more suitable plant-growing environments, remedial soil management actions include irrigation, aeration, radial trenching, mulching, and fertilization, all of which further alter the physical, chemical and biological properties and thus the nitrogen status of urban soils. In the present study, comparison of mineral profile of the selected trees from the college campus were analysed and the results were compared with the standard mineral profile of the soil.

Keywords: Tree canopy soil, soil forming factors, soil organic matter, minerals.

INTRODUCTION

Urban greening refers to any vegetation effort including the planting of trees, shrubs, grass or agricultural plots whose design is intended to improve the environmental quality economics opportunity or aesthetic value associated with a cities Landscape. Soils that are well watered and have high plant productivity generate higher levels of soil organic matter. Colder climates also inhibit rapid decomposition and allow organic matter to accumulate faster. Peri-urban conditions typically lie along the vegetation-soil axis with decreasing vegetation toward the right from the peri- urban base line essentially devoid of impervious surface. The tangible benefits of urban forests include availability of fruit, fuel wood and small timber. Over the coming decades, our cities likely face an array of associated problems, including: rising temperature, water shortages, food scarcity and increased storminess with concomitant flooding, wind damage and coastal erosion.

"Soil is a living entity the crucible of life a seething foundry in which matter and energy are in constant flux and life is continually created and destroyed". Soil organic matter is often viewed as the thread that links the biological, chemical and physical properties of a soil. It has been associated with numerous soil functions like nutrient cycling, water retention and drainage, erosion contract, disease suppression and pollution remediation. Soil organic matter also binds plant micronutrients like iron, aluminium, zinc, copper and manganese by chelation. A Soil organic matter supplies carbon and energy to soil microbes.

Urban greening can reduce air pollutants to varying degrees and directly reduced when dust and smoke particles are trapped by the vegetation. Plant absorbs toxic gases, especially those from vehicle exhausts, which are a major component of urban smog. Humans and nature as a general approach also serving the inhabitants of the city with strong green qualities for their wellbeing. Urban forestry is the art, science and technology of managing trees and forest resources in and around urban community ecosystems for physiological, sociological, economical and aesthetic benefits, trees provide for society (Miller, 1997).

MATERIALS AND METHODS

Study Area

Coimbatore is a city in Tamil Nadu, South India. It is the second largest city and urban agglomeration in the Indian state of Tamil Nadu after Chennai. It is the capital city in Kongu nadu region and is often been referred to as the Manchester of south India. The city is located on the banks of the Noyyal River surrounded by the Western Ghats and is administered by the Coimbatore Municipal. Nirmala college academic campus is located in the southern parts of the Western Ghats. The total area of college campus is 20 acre. The temperature during both summer and winter varies between 28º c to 34º c. Soil in this area is red loamy soil which is more fertile than sandy soil. Its porosity allows high moisture retention and air circulation.

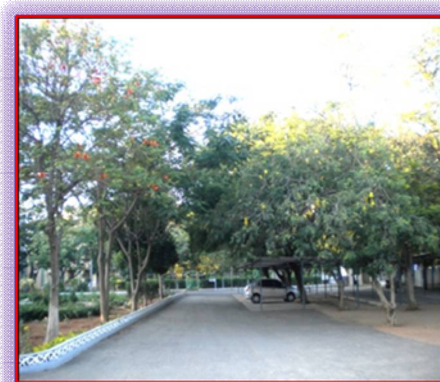


Plate-1 Study area

Plate- 2 Location Map

Collection of tree canopy soil samples

For the present study five different trees of different genera were selected in the college campus to find out the Physical parameters of tree canopy soil. The tree canopy soil samples were collected during the year, 2013. Soil with litter formation and ground vegetation from the corners and center of the selected samples of *Butea monosperma*, (*Lamk.) Taub.*, *Jacaranda mimosifolia*, *D. Don.*, *Cassia fistula*, *Linn.*, *Albizzia lebbeck (L), Benth., and Peltophorum pterocarpum (DC.)k. Heyne.*, were collected separately in sterile bags. Barren land soil is taken from the same campus was kept as control. Soil was taken from the depth of 0-50cm. Soil samples were packed in sterile bags, and as soon as possible returned to the laboratory and processed within 2 days.

Mineral profile of the selected tree canopy soil
The variations in the soil microbial biomass nitrogen of the five samples of soil were statistically significant and discrete.

Sample: 1 -Plate 3:
Butea monosperma, (Lamk.)

Sample: 2 -Plate 4:
Jacaranda mimosifolia, D. Don., Taub.,

Sample: 3 - Plate 5:
Cassia fistula, Linn .,

Sample*: 4*- Plate 6:
Albizzia lebbeck, (L,)Benth.,

Sample: 5- Plate 7 :
Peltophorum pterocarpum, (DC.) k.Heyne .,

RESULTS AND DISCUSSION
Mineral profile of the selected tree canopy soil
Soil Moisture

Soil moisture values showed the overlapping trends as different samples had different values. The maximum soil moisture was recorded in *Albizzia lebbeck*, *(L)*, *Benth.,*. On the other extreme, minimum value was recorded in *Cassia fistula, Linn.,*. The top soil has very little soil organic matter because high temperatures and moisture quickly decompose soil organic matter (Chart 1). The rate of soil organic matter decomposition increases when the soil is exposed to cycles of drying and wetting compared to soils that are continuously wet or dry (James, 2010). Water content in leaves, stems, tap roots and lateral root tissues significantly decreased with increasing concentration of salt in soil. There was maximum water content in lateral roots and minimum in leaves. Tissues, according to their water content can be arranged in the following decreasing order: lateral roots > tap roots > stems > leaves **(**Taiz, 2006).
Mineral profile of the selected tree canopy soil (table-1)
The variations in the soil microbial biomass nitrogen of the five samples of soil were statistically significant and discrete. The highest microbial biomass nitrogen was quantified in *Jacaranda mimosifolia, D. Don., and* lowest was recorded in *control*. Soil from Tree canopy of *Cassia fistula*, *Linn.*, had the maximum potassium level followed by *Jacaranda mimosifolia, D.Don., and* the control had minimum soil Potassium (Chart 2).
Percent of Phosphate in the soil canopy of *Albizzia lebbeck*, *(L)*, *Benth.*, and *Butea monosperma* (*Lamk.) Taub.,* was found to be maximum and in *Peltophorum pterocarpum (DC.) k.Heyne*., followed by *Cassia fistula*, *Linn.*, and *Jacaranda mimosifolia*, *D. Don.*, and the lowest recorded in control *(*Chart 3).
Significant differences were recorded in the calcium content among the five samples of soil canopy. The maximum value was recorded in *Jacaranda mimosifolia D. Don.,* and minimum was found in control (Chart 4).
The percentage of magnesium was found to be high in *Albizzia lebbeck*, *(L)*, *Benth.,* and low in control (Chart 5). The canopy soil from *Albizzia lebbeck, (L), Benth.,* shows high level of chloride with the

percentage of 0.3431 followed by *Butea monosperma (Lamk.) k. Heyne.,* with the percentage of 0.3391and the minimum value was recorded in control with the percentage of 0.0006 (Chart 6).
The tree canopy soil from *Albizzia lebbeck, (L), Benth.,* shows high level of chloride with the percentage of 0.3431 followed by *Butea monosperma (Lamk.) k. Heyne.,* with the percentage of 0.3391and the minimum value was recorded in control with the percentage of 0.0006 (Chart 7).
The variations in sodium content of the different samples of soil canopy shows maximum in *Jacaranda mimosifolia, D. Don.,* with the percentage of 0.01041 percentage followed by *Butea monosperma(Lamk.) Taub.,* with the percentage of 0.0097 and the minimum percentage was recorded in control (0.00001 %), (Chart 8).Soil canopy of *Jacaranda mimosifolia, D. Don.,* (0.0032%) shows high content of sulphate followed by *Butea monosperma(Lamk.) Taub.,* (0.0031%). Minimum level was recorded in control (0.0003%), (Chart 9).

Table 1: Mineral profile of the selected tree canopy Soil

S.No	Minerals	Control	*Butea monosperma*	*Jacaranda mimosifolia*	*Cassia fistula*	*Albizzia lebbeck*	*Peltophorum pterocarpum*
1	Nitrogen	0.030	2.776	**3.562**	0.657	3.090	2.051
2	Potassium	0.0009	0.0195	0.252	**0.267**	0.017	0.0104
3	Phosphate	0.010	0.1183	0.0096	0.0205	**0.1219**	0.0606
4	Calcium	0.0081	0.2048	**2.9866**	0.4214	2.4673	1.3519
5	Magnesium	0.0081	0.4324	0.3288	0.0308	**0.6239**	0.3418
6	Chloride	0.0006	0.3391	0.3123	0.0292	**0.3431**	0.1289
7	Iron	0.0057	0.4552	0.4932	0.1079	**0.6522**	0.4351
8	Sodium	0.00001	0.0097	**0.01041**	0.0010	0.0096	0.0083
9	Sulphate	0.0003	0.0031	**0.0032**	0.0005	0.0028	0.0017

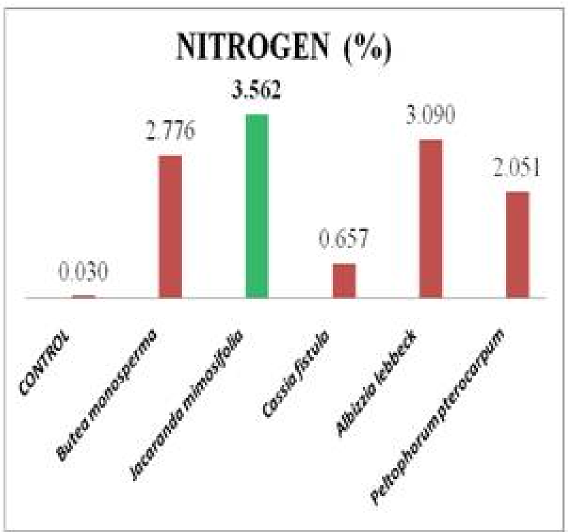


Chart – 1: Comparative Nitrogen content of the selected tree canopy soil

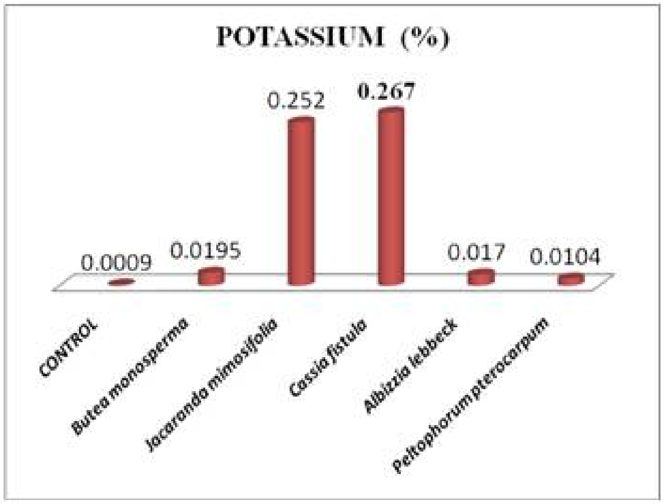


Chart – 2: Comparative Potassium content of the selected tree canopy soil

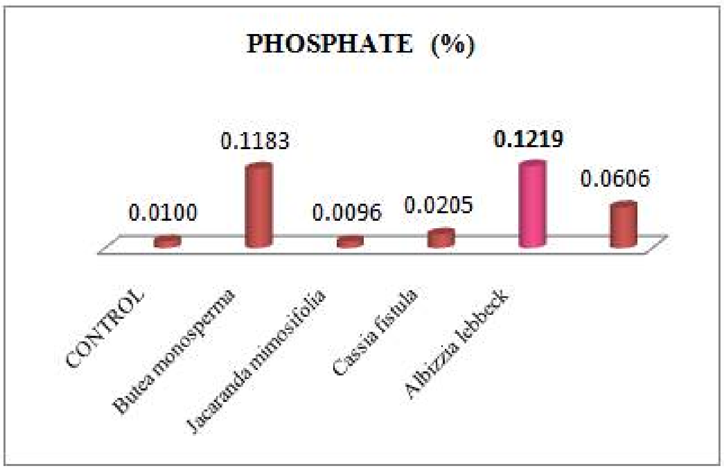


Chart – 3: Comparative Phosphate content of the selected tree canopy soil

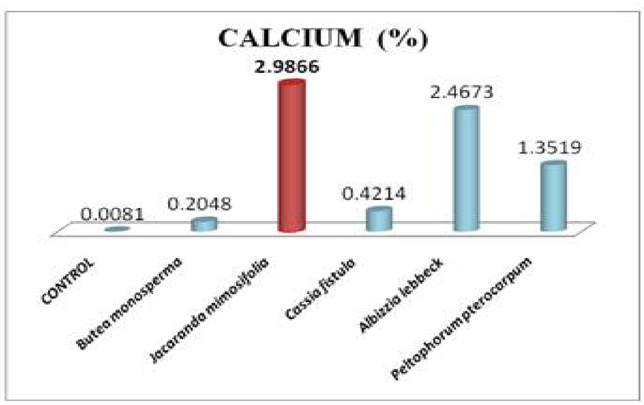


Chart – 4: Comparative Calcium content of the selected tree canopy soil

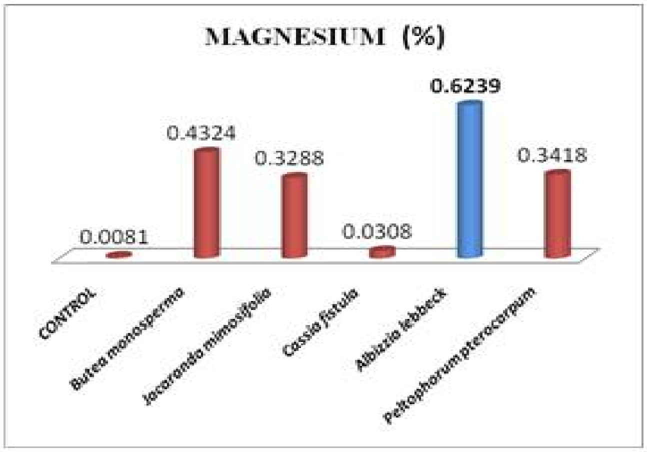


Chart – 5: Comparative Magnesium content of the selected tree canopy soil

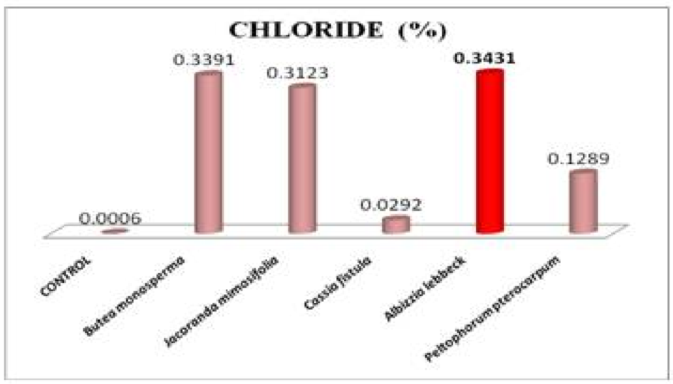


Chart – 6: Comparative Chloride content of the selected tree canopy soil

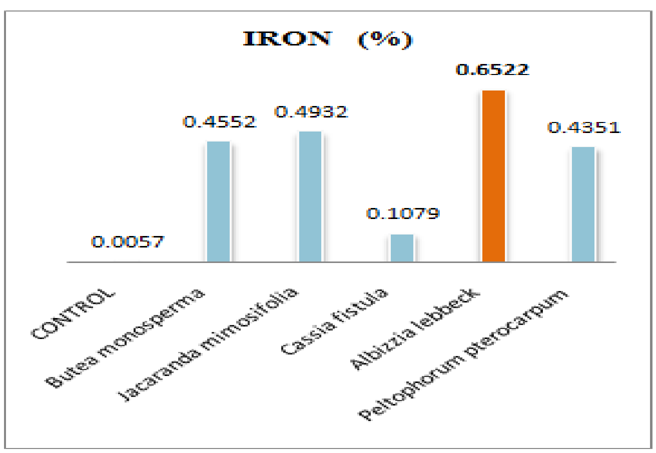


Chart – 7: Comparative Iron content of the selected tree canopy soil

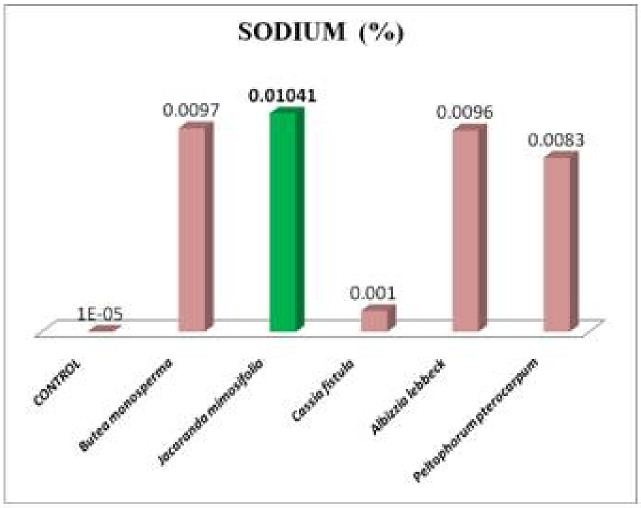
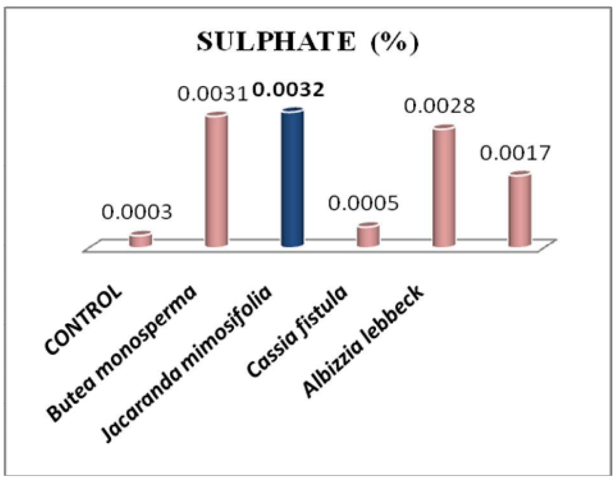


Chart – 8: Comparative Sodium content of the selected tree canopy soil



Chart–9: Comparative Sulphate content of the selected tree canopy soil

REFERENCES

1. James J Hoorman. Cover Crops and Water Quality Extension Educator Ohio state University extension, rafiq Islam Cover Crops and Water Quality soil and Water Specialist, understanding soil microbes and Nutrient Recycling TDD No.800-589-8292(Ohio only) or 614-292-1868. 2010.
2. Miller RW. Tree fertilization, Science, myth and ethics, Arborist News Dec. 1998;26-27.
3. Motsara MR. Available Nitrogen. Phosphorus and Potassium States of Indian Soils and depicted by soil fertility maps. Fertilizer news. 2002;47(8).
4. Taiz L and Zeiger E. Plant Physiology,(4th eds), Sinauer Associates Inc., publishers, sunderland, USA, 2006.