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Research Article

STUDY ON MICROBIAL COUNT OF THE BACTERIAL AND FUNGAL COLONIES OF THE SELECTED TREE CANOPY SOILS RELATED WITH URBAN GREENING IN NIRMALA COLLEGE CAMPUS, COIMBATORE, TAMILNADU, INDIA

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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. Soil microbes are affected by various abiotic and biotic factors in urban ecosystem due to land use change. The effects of different land use patterns on soil microbial properties and soil quality. With the development of urbanization and individualization, the rapid expansion of urban space and the intense of human activities significantly affected ecosystems services. In the present study, Bacterial colony of the selected tree canopy soils from the college campus were analyzed and the resulted.

INTRODUCTION

A soil population by a diverse, active microbial population is less likely to support uncontrolled spread of plant pathogens. Interactions between beneficial soil organisms and plant pathogens create situations in which pathogens are suppressed or inhibited, especially soil-borne pathogens. Some soil microorganisms are antagonistic to plant pathogens, creating an unfavorable environment for them to grow. Others completely against pathogens, effectively keeping the pathogen population in check, there is also evidence that soil microorganisms can induce the plant itself to fight disease.Changes of urban land use patterns are major features of urban development, and also the main factors that result in the degradation of urban ecosystem services and global environmental issue attracting global attention. The amount of organic matter that accumulates is influenced by temperature and moisture. Soil organic matter is derived from decomposed plant leaves and other carbonaceous, materials on the ground surface.

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Soil organic matter also binds plant micronutrients like iron, aluminum, zinc, copper and manganese by chelation. A Soil organic matter supplies carbon and energy to soil microbes. A soil rich in organic matter and regularly supplied with different kinds of soil organic matter will support a rich and varied population of soil organisms. Organic matter provides a carbon source for primary producers like *Cyanobacteria.* They can convert atmospheric nitrogen to plant available Nitrogen forms. Organic matter is the principle food source for secondary consumers. The most predominant functional group of secondary consumers are the decomposers: Bacteria, Fungi and *Actinomycetes*. Decomposers quickly colonize newly added organic materials and begin the decomposition Process. It is during this decomposition process that nutrients become available to plants humus is created, and soil- building aggregation and channels are formed.

The natural processes that generate soil organic matter are often interrupted in an urban environment. Various aspects of the urban environment (e.g. pavement, bagging leaves, grass clippings, removal of tree branches) prevent the cycling of organic matter and nutrients back into the soil, without decay of plant materials, microorganisms in the soil cannot persist.

Therefore the restoration of urban soils often involves increasing the amount of soil organic matter. If soil has little or no odor, microbial activity is poor or absent and the amount of organic matter is often low. If soil has an "earthy" odor, microbial activity is good and aerated organic matter is present in the soil. Soil with a putrid or sour odor either has been wet for a long time or has had improperly processed compost applied. The presence of earthworms in a soil is a sign of good soil conditions, but if the earthworms are skinny or anemic-looking, the soil might lack good nutrition and be low in organic matter. Lack of earthworms is a fair indicator of compaction; in the case of friable soils, this condition can indicate heavy metal or chemical contamination or extremely low organic matter content.

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.

Plate1. Study Area

Plate 2. Location Map

SAMPLE 1. Plate 3.
Butea monosperma, (Lamk.) Taub.,

SAMPLE 2. Plate 4.
Jacaranda mimosifolia, D. Don.,

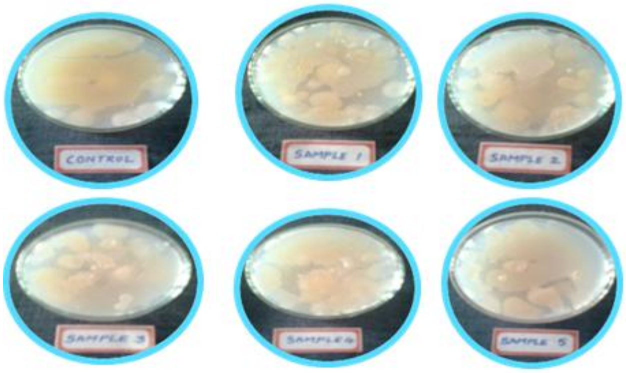
SAMPLE 3. Plate 5. *Cassia fistula, Linn.,*

SAMPLE 4. Plate 6. *Albizzia lebbeck,(L,)Benth.,*

SAMPLE 5. Plate 7. ***Peltophorum pterocarpum, (DC.) k.Heyne .,***

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. The variations in the soil microbial biomass nitrogen of the five samples of soil were statistically significant and discrete.



Microbial count of the selected tree canopy soil - Day 1 - Plate 8.

Microbial count of the selected tree canopy soil - Day 2 - Plate 9. (Bacterial and Fungal colony)

Microbial count of the selected tree canopy soil - Day 3 - Plate 10.

RESULTS AND DISCUSSION

Bacterial and Fungal Colonies of the Selected tree Canopy Soil

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.

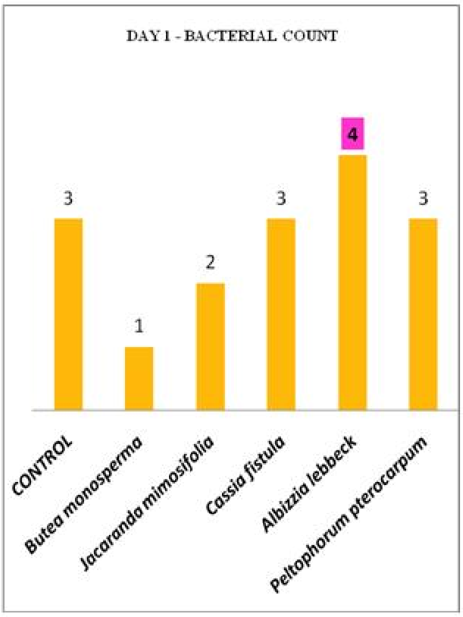


Chart 1. Day 1 Bacterial count of the selected tree canopy soil

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).

Table 3. Microbial count of the selected tree canopy soil

Day	Control		*Butea monosperma*		*Jacaranda mimosifolia*		*Cassia fistula*		*Albizzia lebbeck*		*Peltophorum pterocarpum*	
	B	F	B	F	B	F	B	F	B	F	B	F
1	3	0	1	0	2	0	3	0	4	0	3	0
2	3	2	4	5	3	2	3	5	5	6	4	5
3	4	5	5	7	4	3	3	7	7	6	4	5

B – Bacterial colonies
F – Fungal colonies

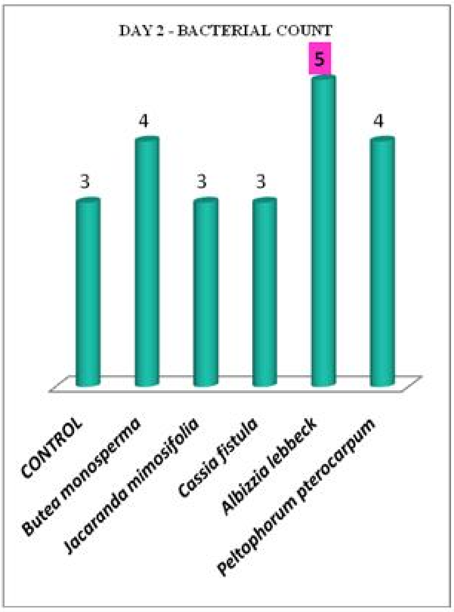


Chart 2. Day 2 Bacterial count of the selected tree canopy soil

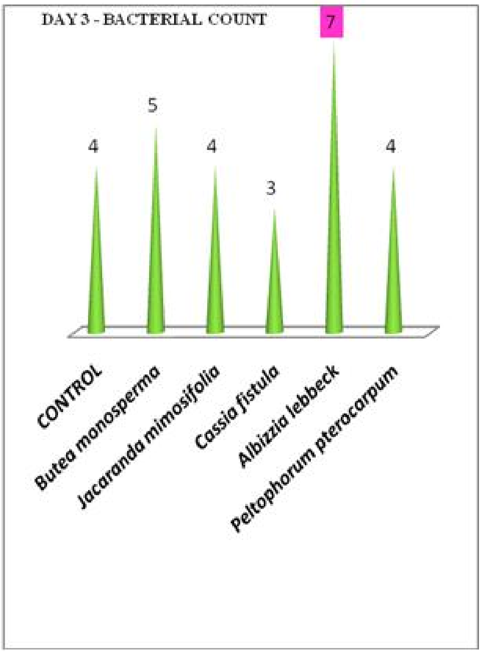


Chart 3. Day 3 Bacterial count of the selected tree canopy soil

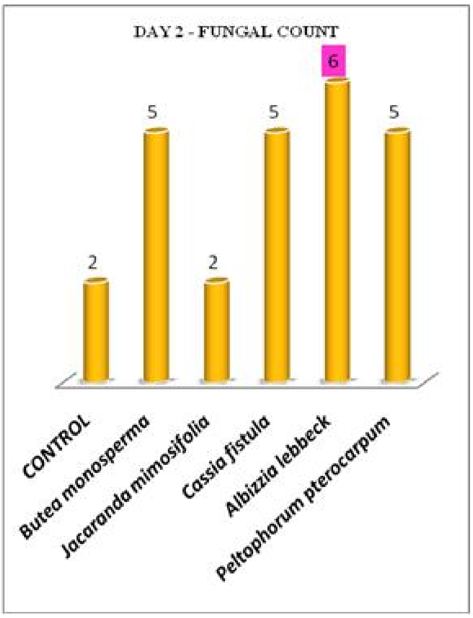


Chart 4. Day 2 Fungal count of the selected tree canopy soil

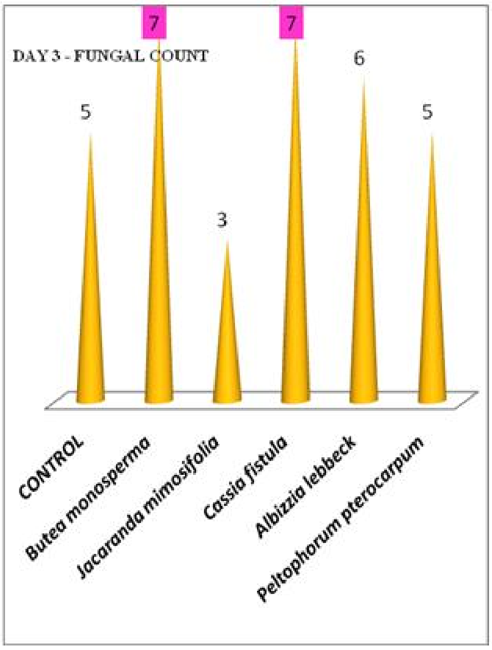


Chart 5. Day 3 Fungal count of the selected tree canopy soil

Microbial count of the selected tree canopy soils of the Bacterial colonies and Fungal colonies were represented in (Plates8-10), Charts (1-5)

Day 1 Bacterial count of the selected tree canopy soil

The bacterial colony was found to be more in *Albizzia lebbeck, (L), Benth.,* followed by *Peltophorum pterocarpum, (DC.) K.Heyne., Cassia fistula, Linn.,* and control. The bacterial count was less *in Butea monosperma (Lamk.) Taub.,* (Chart -1).

Day 2 Bacterial count of the selected tree canopy soil

The number of bacterial colony was high in *Albizzia lebbeck, (L), Benth.,* (5) followed by *Peltophorum pterocarpum(DC.) k. Heyne.,*(4) and *Butea frondosa(Lamk.) Taub.,*. In control *cassia fistula, Linn.,*and *Jacaranda mimosifolia, D. Don.,* the bacterial count was found to be 3 (Chart-2).

Day 3 Bacterial count of the selected tree canopy soil

The number of bacterial colony was high in *Albizzia lebbeck, (L), Benth.,* (7). In control, *Jacaranda mimosifolia, D. Don.,* and *Peltophorum pterocarpum (DC.) k. Heyne,* the bacterial colony was found to be (4). The colony was less in *Cassia fistula, Linn.,* (Chart- 3).

Day 2 Fungal count of the selected tree canopy soil

The fungal count was (6) in *Albizzia lebbeck, (L), Benth.,* and (5) in *Butea monosperma (Lamk.) Taub., Cassia fistula, Linn., Peltophorum pterocarpum (DC.) k. Heyne.,* then, the fungal colony was (2) in control and *jacaranda mimosifolia, D. Don.,*(Chart-4).

Day 3 Fungal count of the selected tree canopy soil

The fungal count was found to be (7) in *Butea monosperma (Lamk.) Taub.,* and *Cassia fistula ,linn.,* followed by *Abizzia lebbeck,(L), Benth*., (6). In control and *Peltophorum pterocarpum (DC.) k. Heyne*., the fungal count was (5). The less number of fungal count was recorded in *Jacaranda mimosifolia, D. Don.,* (Chart-5).

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APPENDIX

TABLE: Microbial count of the selected tree canopy soil samples

LIST OF PLATES

PLATE: 1 Study area
PLATE: 2 Location map
PLATE: 3 Sample 1- *Butea monosperma (Lamk.) Taub.,*
PLATE: 4 Sample 2- *Jacaranda mimosifolia, D. Don.,*
PLATE: 5 Sample 3- *Cassia fistula, Linn.,*
PLATE: 6 Sample 4- *Albizzia lebbeck, (L,) Benth.,*
PLATE: 7 Sample 5- *Peltophorum pterocarpum, (DC.*) *k. Heyne.,*

MICROBIAL COUNT OF SELECTED TREE CANOPY SOIL SAMPLES

COMPARATIVE BACTERIAL COUNT: PLATES (8-10)

PLATE: 8 Microbial count of the selected tree canopy soil - Day 1
PLATE: 9 Microbial count of the selected tree canopy soil - Day 2
PLATE: 10 Microbial count of the selected tree canopy soil - Day 3

LISTS OF CHARTS (CHARTS 1 - 9)

MICROBIAL COUNT OF SELECTED TREE CANOPY SOIL SAMPLES COMPARATIVE BACTERIAL COUNT (CHARTS 1 -3)

CHART 1: Day 1 - Bacterial count of the selected tree canopy soil sample
CHART 2: Day 2 - Bacterial count of the selected tree canopy soil sample
CHART 3: Day 3 - Bacterial count of the selected tree canopy soil sample

COMPARATIVE FUNGAL COUNT (CHARTS 4 and 5)

CHART 4: Day 2 - Fungal count of the selected tree canopy soil sample
CHART 5: Day 3 - Fungal count of the selected tree canopy soil sample

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