

COMPARATIVE STUDY ON PHYSICOCHEMICAL PARAMETERS OF NORMAL AND INFECTED EUCALYPTUS SPECIES SOIL

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ABSTRACT

Soil is an important abiotic factor for plant communities. It serves as a habitat for plants. Plant growth and yield depends on soil physicochemical parameters. Eucalyptus species are used for medicinal properties. Eucalyptus species soil were collected from Thalavadi, Erode District. Altitude of Thalavadi is 823 m from sea level. Normal Eucalyptus tree soil and infected Eucalyptus tree soils were collected for the analysis of physicochemical parameters. Distance of these two soil samples were one feet only. Physicochemical parameters studies were carried out in Soil Testing and Technology Advisory Centre, TNAU, Coimbatore. No nutrient depletion was detected in both the soil samples. Macronutrients nitrogen, phosphorus were present in medium level in both the soil samples. Potassium was present in higher amount in two soil samples. Micronutrients were present in sufficient level in two soil samples. But there was variation between soil physicochemical properties of two samples.

Key words: Eucalyptus soil, physicochemical parameters, macronutrients, micronutrients

INTRODUCTION

Many countries have planted million hectares of Eucalyptus. It is a fast growing tree. It grows in a range of diverse climates and soil types. Natural forests are dominated by Eucalyptus in their natural habitats [Zegeye H, 2010, Pohjonen V, 1989, Yitaferu B, et al., 2013]. It is mostly cultivated for lumber, construction and fuelwood. Eucalyptus species generally cultivated in farmers crop land, boundaries of cropland and marginal lands [Tilashwork Chanie et al., 2013]. Forests of Eucalyptus possess many benefits to the human populations.

Tree species has an effect on soil physicochemical properties. In long term trees have an ability to produce changes in the soil properties, it may be progressive or regressive evolution. Soil physicochemical properties are one of the important factors to measure the soil quality [X. Q. ZHAO1 et al., 2014]. Soil functions are very complex. Each and every soil properties have specific role in maintaining the soil quality [Ambachew D., et al., 2012]. To evaluate the soil quality, all the physicochemical properties of the soil are taken into consideration. Based on single property, the results are not reliable or accurate.

For increasing plantation productivity, management of soil fertility and plant nutrition are important [Smethurst, P.J, 2000, 2010, Pinkard, E.A, 2003]. Need of fertilization is mainly dependent on the soil nutrient level.

MATERIALS AND METHODS

STUDY AREA

Thalavadi in **Thalavadi** Taluk, nearby Sathyamangalam, Erode District, Tamil Nadu, India, located at 11°46'42"N 77°0'19"E, 4 kilometres (2.5 mi) south of Suvarnavathi Reservoir and chikkahole dam on a local road off NH 209, and 18 kilometres (11.2 mi) north of Thalamalai.

SAMPLE COLLECTION

Soil samples were taken from the depth of 0–20 cm in June 2018. Normal and infected Eucalyptus tree species are present in the same area. The distance between the two trees are just one feet. One plant is normal in morphological parameters. The other Eucalyptus species is infected by a pathogen. The trunk is infected with canker disease. The objective of the study is to evaluate the difference between soil physicochemical properties of normal and infected Eucalyptus tree species. Soil physicochemical parameters were estimated by soil analysis methods in Soil Testing and Technology Advisory Centre, TNAU, Coimbatore.

Table No: 1 physicochemical parameters of normal and infected eucalyptus species soil

PARAMETERS	NORMAL EUCALYPTUS TREE SOIL (A)	INFECTED EUCALYPTUS TREE SOIL (B)	UNITS	COMMENTS
Organic Carbon	2.71	3.86	(%)	High
pH	5.25	5.11	-	Strongly acidic
EC	0.16	0.15	dS m ⁻¹	Non saline
Nitrogen	328	308	Kg/ha ⁻¹	Medium
Phosphorus	29.5	30.4	Kg/ha ⁻¹	Medium
Potassium	1095	1225	Kg/ha ⁻¹	High
Zinc	3.94	1.81	ppm	Sufficient
Copper	16.58	16.18	ppm	Sufficient
Ferrous	38.60	53.00	ppm	Sufficient
Manganese	24.42	10.68	ppm	Sufficient
Boron	1.32	1.44	ppm	Sufficient

RESULTS

Soil texture is sandy clay loam. Soil type is reddish brown. Lime status is non calcareous for both the samples A, B. pH is for soil (A- 5.25), (B -5.11). Electrical conductivity for A – 0.16, for B – 0.15 dS⁻¹. Nitrogen is 328 kg/ha⁻¹ for A, and 308 kg/ha⁻¹ for B. Phosphorus is 29.5 kg/ha⁻¹ for A and 30.4 kg/ha⁻¹ for B. For A - 1095 kg/ha⁻¹, for B – 1225 kg/ha⁻¹ potassium was present. Micronutrients zinc, copper, ferrous, manganese and boron were estimated for both the samples. Zinc is 3.94 ppm for A, 1.81 ppm for B. Copper is 16.58 ppm for A, 16.18 ppm for B. Ferrous is 38.60 ppm for A, and 53.00 ppm for B. Manganese is 24.42 ppm for A, 10.68 ppm for B. Boron is 1.32 ppm for A, 1.44 ppm for B.

DISCUSSION

There is a slight variation in pH. pH is strongly acidic for both the samples. Electrical conductivity also showed minor variation. They were non-saline. In macronutrients, nitrogen and phosphorus were present in medium amount in both the soil samples. Higher amount of potassium is present in both the samples. In both the soil samples, potassium, nitrogen and phosphorus were ordered (potassium > nitrogen > phosphorus) based on their presence in soil. The tree's foliage get affected by yellowing, wilting and browning. Before dormancy, a tree starts to drop leaves. These are all due to over fertilization [Steve Nix, 2018]. All the micronutrients were sufficiently present in both the soil samples.

Nitrogen, phosphorus and potassium are important macronutrients for plants. In both the soil samples potassium was present in higher amount than the other two nutrients. In the soil potassium is present in three different forms. The three forms of potassium are fixed, non – exchangeable and exchangeable forms. Moist clay particle or organic matter provided the potassium ions (K⁺). This only form is taken up by the plant, and this is called as exchangeable potassium. The sources for potassium are mica and feldspar minerals. They are the reason for 90% of potassium reserves in soil. These two minerals are reason for the presence of higher amount of potassium in soil. The regions where the climate is humid and wet, the leaching of potassium is slow or minimal this leads to lower amount of plant available potassium. Decaying of plant materials make higher amount of potassium in soil [Jacob J. Wright, 2017].

CONCLUSION

There is no significant variation between the two soil samples for physicochemical parameters. Major variation is only in potassium level in both the soil samples. In both of the acidic soils iron content is higher. The nutrient parameters are complex due to the interactions of many factors. Eucalyptus has positive influence on soil organic matter and availability of nutrients in soil.

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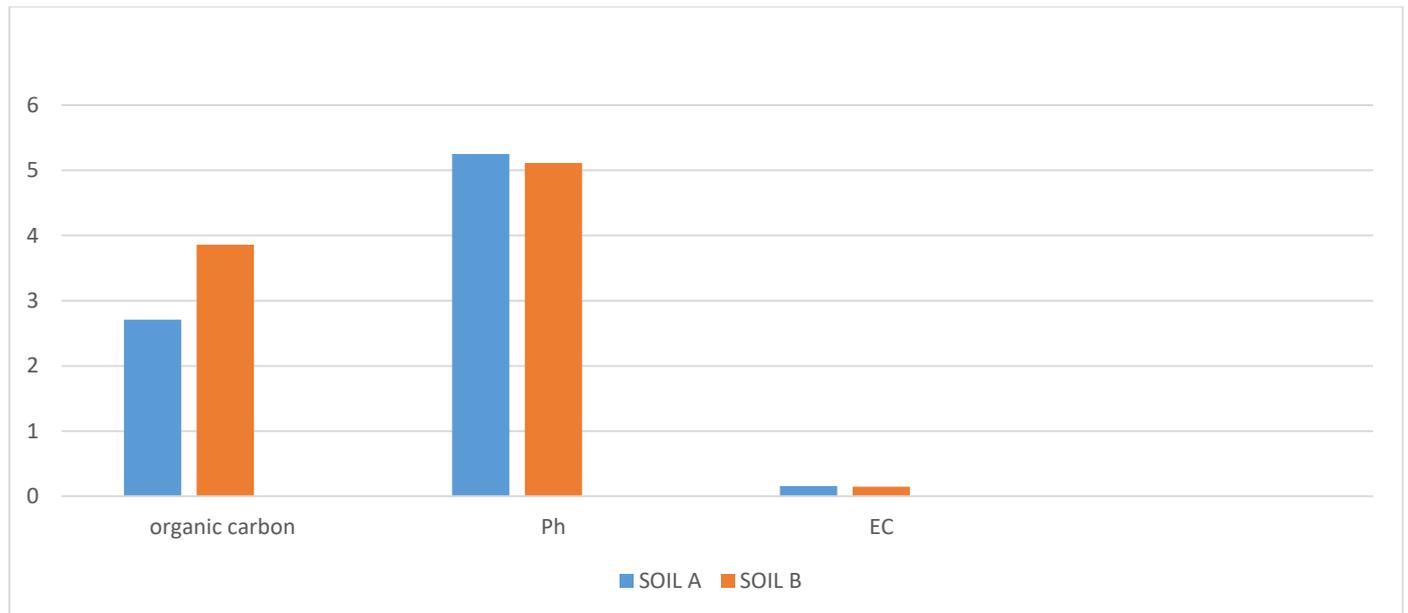


Figure no : 1 soil chemical parametres

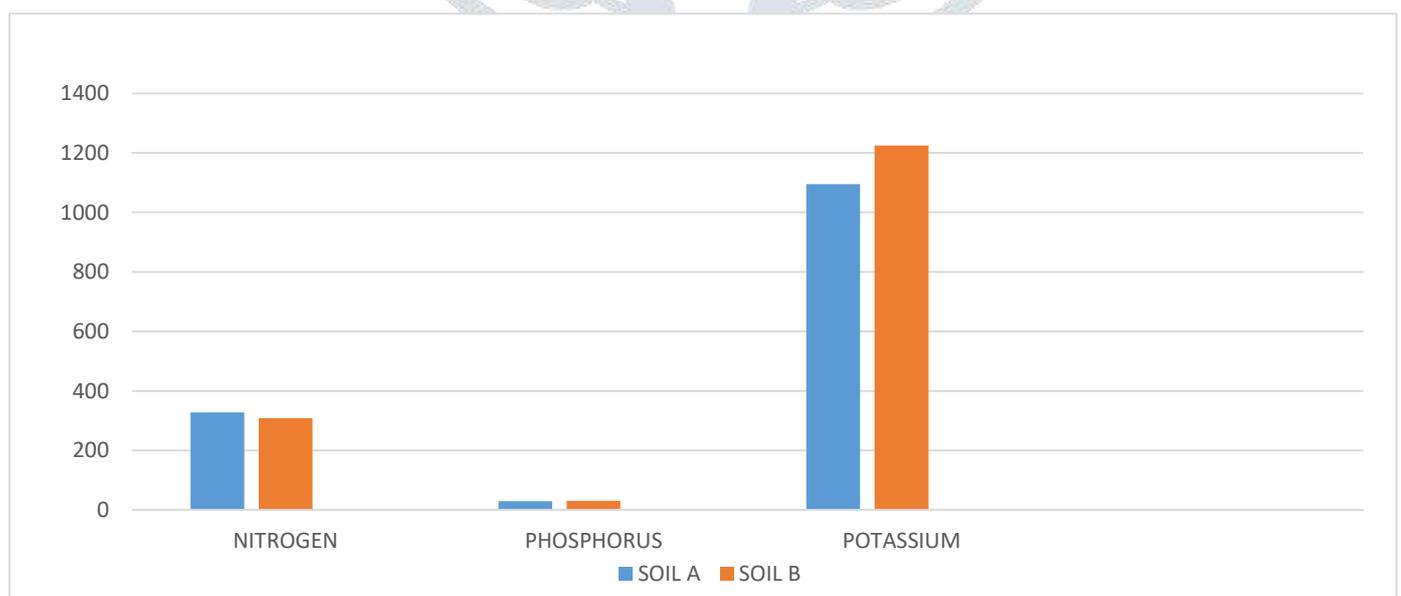


Figure no : 2 Macronutrients - kg/ha⁻¹

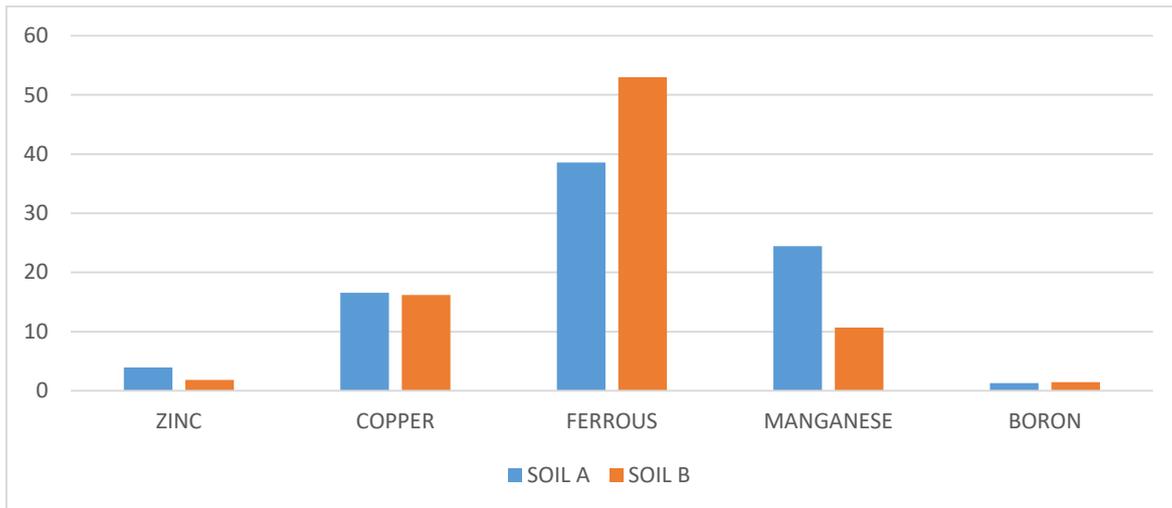


Figure no : 3 micronutrients - ppm

