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Comparison of Rhizospheric Soil Nutrients and Microbial Analysis with Two Different Weed Plants in Kalaburagi District, Karnataka

Vanamala .G Sheri[1] and Pratima Mathad[2]
[1]Department of P. G. Studies and Research in Botany, Gulbarga University, Kalaburgi, Karnataka,India
[2]Professor, Department of P.G Studies And research in Botany, Gulbarga University Kalaburagi, Karnataka, India.
*Corresponding Authors email:vanamala1978@gmail.com

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ABSTRACT

The important abiotic factor for the plants is soil. It which includes various nutrients and microorganisms for well adapting of plant to environment. The soil near to the face of a root of plant is called rhizosphere Rhizosphere is a vital region of plant ecosystem. which includes various nutrients and micro organisms for well adapting of plant to environment. This study is aimed at assessing rhizospheric nutrient content cultural bacterial fungi.and actinomycetes density in the rhizosphere of *Cassia sericea* and, which grow profusely in nutritionally-poor soils and environmentally-stress conditions as weed on road side , waste land and agricultural land. The rhizospheric soil of both the weeds are slightly alkaline. Both of the soil have rich organic content. Electric conductivity is more in .Nitrogen, Potassium, Zinc, Sulphur ,are more in *Cassia sericea*..Hence C. sericea is more dominant than in *Parthenium hysterophorus* . Phosphorus and Iron content is more in *Parthenium hysterophorus*. In microbial analysis . C. sericea have much more bacterial colony and actinomycetes than Parthenium hysterophorus. But fungi are more in *Parthenium hysterophorus*.so both weed plants have comparatively rich in rhizosperic soil nutrition content and microbial density than normal soil this may the one of the reason for their wide spread growth.

Keywords : Nutrients pH, soil, minerals, Organic carbon

I. INTRODUCTION

The activity of plant root surrounding area influences physiochemical and biological activity in the surrounding rhizosphere compartment, and vice versa. These processes are determining nutrient availability, cycling of nutrients and solubility of toxic elements for plants and microorganisms, thereby creating the rhizosphere as a unique microecosystem. .Plant developmental processes are controlled by internal signals that depend on the adequate supply of mineral nutrients by soil to root and root to shoot. Thus, the availability of plant nutrients can be a major constraint to plant growth in many environments.

Plants take up most of mineral nutrients through the rhizosphere where microorganisms interact with root exudates Rhizospheric bacteria participate in the geochemical cycling of nutrients especially nitrogen, phosphorus andmicr o nutrient as iron ,,manganese, ,zinc, and copper, and determine their availability for plants and soil microbial community Plant root exudates consists of a complex mixture of amino acids, purines, nucleoside organic acid anions, phyto siderophores, , sugars, vitamins, inorganic ions (e.g. HCO3-, OH -,H ?)[1], gaseous molecules (CO2,H 2), enzymes and root border cells which have major direct or indirect effects on the acquisition of mineral nutrients required for plant growth [2]. Rhizosphere was described for the first time by Lorenz Hiltner in 1904 [3]. It varies with the plant species and the soil, generally considered at 2 mm distance from the root surface known as rhizoplane. Researchers have shown that the influence can be up to 10 mm [4–6]. Rhizoplane affects the nutrient availability as well as microbial population The micro-organism diversity is higher near to the rhizoplane. It decreases with an increase in distance from rhizoplane [7, 8] The interaction between plant nutrients in soil and plant exudates modifies the micro climate of the rhizosphere [9]. The soil volume is affected by the root exudates. The microorganisms exert influence on plants. Thus the relationship between microbes and plants may be commensalic, mutualistic, or parasitic. In mineral nutrition, specific organisms are involved in the acquisition of nitrogen (N) (free living or symbiotic nitrogen fixers) and phosphorus (mycorrhizae) and their effects on plant development are well documented Specific plant effects on the bacterial communities of rhizosphere have been observed in members of different plant species including Chrysanthemum [11] Brassica solanum, Fragaria [12], Alopecurus, Anthoxanthum, Arrhenatherum, Holcus, Plantago and Geranium [13] and Camellia sinensis [14] The interaction of plant roots with soil microorganisms through rhizosphere has higher levels of microbial biomass and activity than those in bulk soil. Rhizospheric microbial communities are influenced by the plant exudates, roots as mechanical support and competition for nutrients. Equally, plants are affected by rhizospheric microbial communities through their participation in fast soil nutrients cycle, water dependence and growth promoting metabolites , and high adaptable nature to extreme condition and their profuse growth. it is any plant species is a unique niche harboring diversified bacterial and fungal communities, which serve as potential resource for bio prospecting. The rhizosphere of plant species growing profusely under stress-conditions harbors novel microbes to meet their nitrogen requirement as observed in salt marsh grasses such as Spartina alterniflora, Juncus roemerianus [15] Hence in this study two noxious weeds in region of Kalaburgi, Parthenium hysterophorus and Cassia sericea are selected to study the rhizosphere to know more about the weed plant. Cassia. Sericea annual herb and weed along,railway lines and wastelands. road sides This plant is a native of West India and south America s. It is known to be widespread in Belgum and Dharwad districts of Karnataka. The present location is Kalaburagi of Karnataka is same as it. Ragweed (Parthenium hysterophorus) is an aggressive herbaceous weed of the Asteraceae with an almost worldwide occurrence (Towers et al. 1977). Both these plants are able to thrive well in adverse conditions, making these ecosystems as unique models for studying the diversity of a particular microbial community performing a certain geochemical function. Hence, it is hypothesized

That the two plants should harbor some rich microbes and nutrients in their rhizosphere irrespective of soil types for their N management. Study of these could be beneficial for weed management. .The activity of plant root surrounding area influences physiochemical and biological activity in the surrounding rhizosphere compartment, and vice versa. These processes are determining nutrient availability, cycling of nutrients and solubility of toxic elements for plants and microorganisms, thereby creating the rhizosphere as a unique micro ecosystem, which can exhibit completely different properties compared with the, soil science and soil microbiology strongly depend on the understanding of rhizosphere processes

II. MATERIAL AND METHODS

Rhizosphere soil sampling

Soil samples from rhizosphere soils of both Cassia sericea and Parthenium hysterophorus plants were collected from dry lands near the agricultural college Aland road Kalaburagi , Karnataka. India. The Parthenium hsterophorus and cassia. sericea were uprooted and rhizosphere soil samples were collected. All the samplings were triplicate and assessed separately to avoid sampling bias. Cassia and Parthenium soil samplings were done on same location and the microbiological analysis of the soil samples was carried out . After removing stones and stubbles, the powdered soils were packed in water-tight plastic bags and stored at 200 c for physio-chemical analysis. The physio-chemical properties of the soil samples were analyzed as per the standard procedures

Microbial Analysis

Colony forming units measure the viable bacterial fungal cells and actinomycets .Microbiological analysis was performed by taking 1 gm of the soil in 10 ml of diluted sterile distilled water .1ml of soil suspension was diluted serially and used for analysis of bacteria ,fungi, , actinomycetes. Nutrient agar ,potato dextrose agar, starch casein was used for isolation of bacteria, fungi ,actinomycetes respectively the soil suspension was prepared (according to serial dilution method)was shaken at RT using orbital shaker at 200 rpm for 1 hour. 200 micro litre of soil suspension was pipette and spread out over agar plates, [pH7] a series of dilution of suspension from 10-2 to 10-6 were used for plating. .All the plates were incubated for a period 1 week .The experiment was carried out in duplicates .Colony forming units per gram of soil was determined.

III. Result And Discussion

Table I. depicts the results of Rhizospheric soil nutritional analysis sample of parthenium weed plant and Cassia sericea of Kalaburagi district.

The results of parthenium weed are observed as:- PH was found to be 8.2. organic carbon was o.61. EC was found to be 0.61%. Nitrogen was 202 kg/hectare Phosphorus 25.0 kg/ hectare. Potassium was found to be 491 kg/ha. Sulphur 8.2 ppm .Zinc was found to be 0.259ppm. Iron was found to be 5.242 ppm. Copper ppm 1.126. Manganese 8.004ppm.

The results of Cassia are observed as:- PH was found to be 8.4o.rganic carbon was o.14%. Ec was found to be 0.4. Nitrogen was 280 kg/hectare Phosphorus 15 kg/ hectare. Potassium was found to be 878 Kg/ha. Sulphur 9.8 ppm .Zinc was found tobe0.422ppm. Iron was found to be 5.139 ppm. Copper PPm 2.131. Manganese 8.245ppm.

The rhizospheric soil of both the weeds are slightly alkaline. Both of the soil have rich organic content. .Electric conductivity is more in C.sericea. Nitrogen, Potassium, Zinc, Sculpture, are more in Cassia sericea .Hence C. sericea is more dominant than in Parthenium hysterophorus .Phosphorus and Iron content is more in Parthenium hysterophorus.

Colony forming units per gram of soil depicts the density of microbes isolated from rizospheric soil. The bacteria was found to be higher in the rhizosperic soil compared to fungi. Cassia serecia has more number of bacteria than Parthenium hysterophorus. Fungi are more in number in

Parthenium hysterophorus than C.serecia. Soil contains lower number of actinomycetes in C.seriecia as compared to P,hysterophorus. The presence of bacteria, fungi, and actinomycetes shows species richness in the soil.

Table.1. Dipict the results of comparison of rhizosphiric soil analysis.

S. No.	Nutrients	Result	
		Parheniu mhystero phorus	**Cassia sericea**
1.	PH	8.3	8.4
2.	Organic carbon %	0.61%	0.14%
3.	EC (d.si/m)	0.2	0.4
4.	Nitrogen(kg /ha)	202	280
5.	Phosphorus (kg/ha)	25.0	15
6	Pottassium (kg/ha)	491	878
7.	Sulphur (ppm)	8.2	9.8
8.	Zinc (ppm)	0.259	0.422
9.	Iron (ppm)	5.242	5.139
10.	Copper (ppm)	1.126	2.131
11	Manganese (ppm)	8.004	8.245

Table -2 Microbiological analysis ; Of C.sericea and P.hysterophorus rhizosphere

Plant name	Parthenium			Cassia		
Trails	I	II	Mean	I	II	Mean
Bacteria	28x 10^6	12x 10^6	15x 10^6	38x 10^6	40x1 0^6	39x 10^6
Fungi	53x 10^4	65x 10^4	59x 10^4	21x 10^4	36x1 0^4	29x 10^4
actinomycetes	62x 10^2	50x 10^2	58x 10^2	74x 10^2	54x` 10^2	64x 10^2

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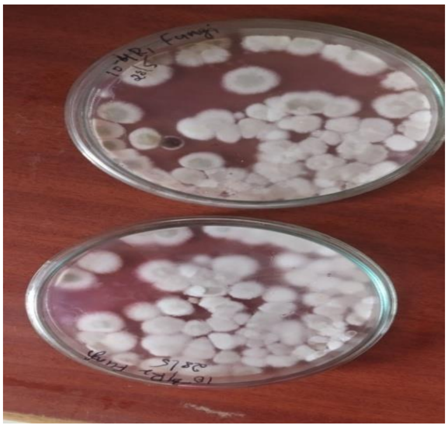
Figures : STUDY OF MICRO ORGANISMS

Bacteria in rhizosphere of Cassia **bactria in rhizosphere of parthenium**



Fungi in rhiziosphere of cassia **Fungi in Parthenium**

Bacteria rhizosphere **Actionomycetes in parthenium c.sericea**