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ANALYSIS OF PHYSICOCHEMICAL PROPERTIES OF COLLECTED RHIZOSPHERIC SOIL OF COMMON SELECTED MEDICINAL PLANTS FROM BETUL

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ABSTRACT:

This study reports the effects of physicochemical properties of Rhizospheric soil from 20 different sites of Betul (Ronda, Malakpur, Umari, Aamdhana, Mahadgav, Padhar, Sihari, Khedala, Badora, Sohagpur, Khedi, Ranipur, Dharakhoh, Betul Bazar, Bhadush, Hamalapur, Gauthana, Jamathi, Bharatbharti, Sonaghati) with medicinal plantation. Rhizospheric Soil samples were collected from different places of Betul madhyapradesh. This study analyzed for physical variables of said sample Rhizospheric soil including moisture content, maximum water holding capacity, field capacity, bulk density and particle density and Rhizospheric soil chemical variables including, organic carbon (0.705,0.930,0.435,0.225etc), total nitrogen (263,315,180,95etc), pH (7.75,7.55,8.57,7.65 etc) and available potassium (9.79,11.07,11.50,12.78 etc). Field capacity and maximum water holding capacity in all the 20 sites irrespective of presence and absence of medicinal plant. In this study, we found that the physicochemical variables of above-mentioned samples of rhizospheric soil were higher in the presence of medicinal plant in all the 20 sites. This study concluded that the practice of medicinal plantation at said mentioned sites showed their impacts on physicochemical properties of Rhizospheric soil. Moreover, medicinal plantation will provide continuous organic matter flow and helps to improve the properties of Rhizospheric soil. Medicinal plants require 12 essential nutrients to grow and survive, classified by their importance into macronutrients (C, N, P, K, Ca, Mg, S) and micronutrients (B, Cu, Fe, Mn, Zn).

KEY WORDS: - Physicochemical property, Rhizospheric soil, medicinal plant, Electrical Conductivity (EC), Organic Carbon (OC), Nitrogen (N), Phosphorus (P), Potassium (K), Zinc (Zn), Cupper (Cu), Iron (Fe), Manganese (Mn), Boron (B), Sulphur (S), Exchange capacity (CEC), Potential of Hydrogen / power of hydrogen (pH).

INTRODUCTION:

The Rhizospheric is the soil zone around the roots in which microbial biomass is impacted by the presence of plant roots. The ability of the Rhizospheric to stimulate microbial activity has been long known. With the increased awareness of the role that microorganisms play in the degradation of s-thiamine herbicides, research began to focus on possible enhanced degradation in the Rhizospheric. The Rhizospheric contains

significant amounts of plant-released carbonaceous substances, which in turn increase and diversify the microbial population around the root zone. Up to 50% of medicinal plants assimilates that are trans located into the roots can be excreted as root exudes and these serve as a food base for microorganisms.

Physicochemical properties as physical properties, salvation properties related to interactions with different media, and properties or molecular attributes that define intrinsic chemical reactivity. The physicochemical properties of interest to chemical alternatives assessment can be used to identify physical hazards and to understand or predict a chemical's environmental fate, human toxicity, or Eco toxicity. The committee cautions that given the active research in the field and the potential for special case concerns to arise for a given compound (e.g., atmospheric reactivity), the properties highlighted in this chapter should be seen as general guidance, and care should be taken by the assessor to ensure that all appropriate physicochemical properties are identified for a given compound and system.Physicochemical properties including surface area, porosity, pH, surface charge, functional groups and mineral contents influence the ability of biochars to adsorb contaminants.

Physical properties are those general properties you notice most readily about a substance, such as its size, state of matter (solid, liquid, or gas), color, mass, density and strength. Values for physical properties can be determined by tests that don't alter the substance being tested. Tests such as determining the color or size of an object don't change it in any way.

Physical properties are the characteristics of matter that can be observed and measured without any change to the chemical identity of the sample. A physical property measurement might change the arrangement of matter in a sample but not the structure of its molecules. When a chemical change or reaction occurs, then the characteristics observed are deemed to be chemical properties.

.OBJECTIVES OF PROPOSED WORK: -

1) To study Physical Properties of collected rhizsopheric soil of common selected medicinal plants from Betul.

2) To explore the Chemical Properties of collected rhizospheric soil of common selected medicinal plants from Betul.

REVIEW OF LITERATURE:

Rhizosphere Microbes Interactions in Medicinal Plants

Zechariah M. Solaiman, Hossain Md Anawar

Medicinal plants have been used extensively in complementary medicines for disease prevention and treatments. The demand for these medicines has been increasing in recent times. Many studies have shown that medicinal plants are interacting with diverse rhizosphere microorganisms such as both free-living and symbiotic microbes. Inoculation with microbes may enhance the growth of medicinal plants, nutrient uptake and the content of medicinal compounds. However, the diversity, function and applications of microbes to medicinal plants have received little attention so far. Studying rhizosphere microbiology in medicinal plants provides a better understanding of the role microbes played for the improvement of plant growth and active compound accumulation. The diversity of

microorganisms in the rhizosphere of medicinal plants and their effect on the plant growth and quality and quantity of medicinal compounds are reviewed.

Rhizosphere Micro biome of Arid Land Medicinal Plants and Extra Cellular Enzymes Contribute to Their Abundance

Abdul Latif Khan, **Sajjad Asaf**, **Raid M. M. Abed**, **Yen Ning Chai**, **Ahmed N. Al-Rawabi**, **Tappan Kumar Mohanta**,**Ahmed Al-Rawahi**,**Daniel P. Schachtman** and **Ahmed Al-Harrasi**

Revealing the unexplored rhizosphere micro biome of plants in arid environments can help in understanding their interactions between microbial communities and plants during harsh growth conditions. Here, we report the first investigation of rhizospheric fungal and bacterial communities of Adenium obesum, Aloe dhufarensis and Cleome austroarabica using next-generation sequencing approaches. A. obesum and A. dhufarensis grows in dry tropical and C. austroarabica in arid conditions of Arabian Peninsula. The results indicated the presence of 121 fungal and 3662 bacterial operational taxonomic units (OTUs) whilst microbial diversity was significantly high in the rhizosphere of A. obesum and A. dhufarensis and low in C. austroarabica. Among fungal phyla, Ascomycota and Basidiomycota were abundantly associated within rhizospheres of all three plants. However, Mucoromycota was only present in the rhizospheres of A. obesum and A. dhufarensis, suggesting a variation in fungal niche on the basis of host and soil types.

MATERIAL AND METHODOLOGY:

Sample Collection:

Collection of 20 Sample from 20 Different Places Of Betul Madhyapradesh. Details are given below:

S.NO	SAMPLE NO.	SAMPLE AREA
1.	AS01	Khedi
2.	AS02	Ranipur
3.	AS03	Dharakhoh
4.	AS04	Betul Bazar
5.	AS05	Bhadush
6.	AS06	Hamalapur
7.	AS07	Gauthana
8.	AS08	Jamathi
9.	AS09	Bharatbharti
10.	AS10	Sonaghati

S.NO	SAMPLE NO.	SAMPLE AREA
11	AS11	Badora
12	AS12	Sohagpur
13	AS13	Khedala
14	AS14	Padhar
15	AS15	Sihari
16	AS16	Aamdhana
17	AS17	Mahadgav
18	AS18	Umari
19	AS19	Malakpur
20	AS20	Ronda

Rhizospheric Soil Electrical Conductivity (EC)

Rhizospheric Soils contain varying amounts of water-soluble salts derived from parent rocks Minerals.

Fertilizers in Irrigation water and decomposition of organic residues. The water-soluble salts in Rhizospheric soils consists of various cations and anions and predominant cations are Na•, ca ve, Mg". H' and the anions are CO-S. HCO-., cr. SO"4. Small quantities of NO"3, POC and boron also occur in Rhizospheric soils. These soluble salts in the Rhizospheric soil restricts the medicinal Plants growth by decreasing the entry of water into the medicinal plant's roots and hence absorption of nutrients. The excessive salts may accumulate due to poor salt-water balance under impeded drainage and high-water table conditions. In case of coastal soils, the seawater intrusion into the inland areas is responsible for salt accumulation. It is, therefore, essential that the amount of these soluble salts is determined to assess the salinity problem of soils and to decide as to which crops can be successfully grown therein as crops differ considerably to salt tolerance. Soluble salts in soils are determined by measuring the EC of soil solution. Electrical conductivity (EC) or specific conductivity is defined as the reciprocal of the resistance of a conductor 1 long and I cm2 in cross sectional area and is expressed as mhos per cm. Since the values of EC are very small for soil solutions, it is expressed as milliohms cm.

Rhizospheric Soil pH (Soil Reaction)

Rhizospheric Soil pH is a crucial soil indicator influencing many physiochemical properties of Rhizospheric soil. pH is defined as the negative log of the hydrogen ion activity. Since pH is logarithmic, the H-ion concentration in solution increases 10 times when its pH is lowered by one unit. Solutions with a pH less than 7 are acidic and solutions with a pH greater than 7 are basic. Pure water is neutral, being neither an acid nor a base. The pH value can be less than 0 or greater than 14 for very strong acids and bases respectively. PH is derived from French word Pouvior hydrogen means power of hydrogen.

pH = -log (H') or pH = -log a (H')

The significance of pH lies in its influence on availability of Rhizospheric soil nutrients, solubility of toxic nutrient elements in the Rhizospheric soil, physical breakdown of root cells, and cation exchange capacity (CEC) in Rhizospheric soil whose colloids (clay/humus) are pH-dependent, the rate of decomposition of Rhizospheric soil mineral is influenced by the Rhizospheric soil pH, microbial activity and physicochemical properties of the Rhizospheric soil, Rhizospheric soil physical properties e.g. structure, permeability etc. medicinal plants root growth, Rhizospheric soil productivity, the quantity of amendments (lime or gypsum) required for Rhizospheric soil. At high pH values, availability of P, and most Micronutrients, except B and Mo, tends to decrease. The pH ranges normally found in soils varies from 3 to 9. Rhizospheric Soil are classified based on Rhizospheric soil pH as

Follows:

1. Strongly acid (pH < 5.0),
2. Moderately to slightly acid (5.0-6.5),
3. Neutral (6.5-7.5),
4. Moderately alkaline (7.5-8.5), and
5. Strongly alkaline (> 8.5).

Organic Carbon (OC):
First, we will take 1 gm Rhizospheric soil then add 10ml of potassium bicarbonate and 20ml sulphuric acid. After adding both materials leave it for 30 minutes. After 30 minutes we will add 20 ml distill water and 1ml Indicler in this mixture. Now time to read result**.**

Boron (B):
First take 25gm Rhizospheric soil and add 50ml 0.01m in it. Boil the material for 5 minutes in hot plate then measure the weight. After measuring the weight keep it to cool and after cooling, we will filter the material and add 5ml filtrate, 2ml Bufter solution and 2ml azomethane H. Now shaking the mixture and add 2ppm to boron to standard. Time to read result.

Potassium (K):
Take 5gm Rhizospheric soil adds 25ml ammonium acetate in it. Now shake the mixture for 10 minutes and filter.

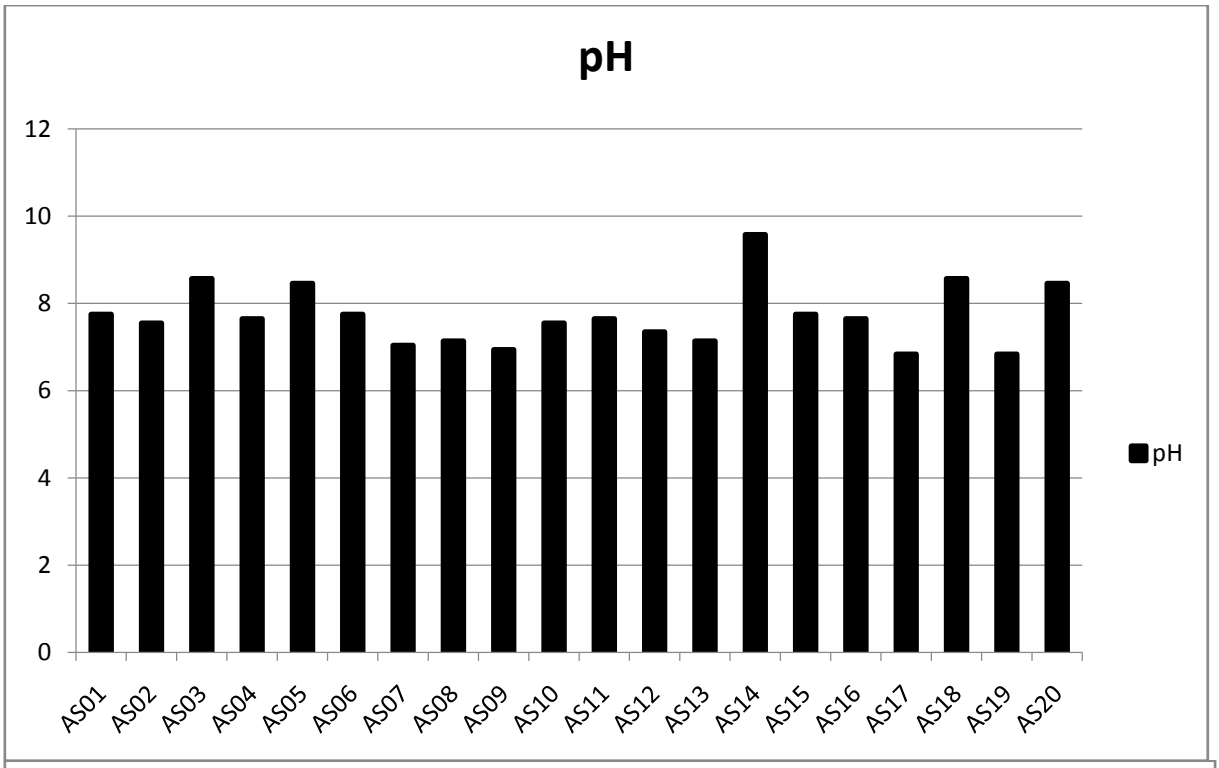
Phosphorus (P):
Take 2.5 gm Rhizospheric soil and adds 50ml (NaHc03) Sodium bicarbonate and 0.5 gm Charcoal now shake the mixture for 30 minutes and filter. After filtering add Ph 8.5, 5ml filter extract, 5ml ammonia molybdenum, 5 ml working solution and distill water. Now reading the colour at 660 mm.

Sulphur(S):
Take 10 gm Rhizospheric soil in 150 ml conical flask and add 50 ml 0.15 % cacl 2 solution shake it through whatmen filter paper 42 then take 10 ml filtrate 25 ml volumatric flask and add 1 gm BaCI2 crystal & make up the vol. with dw. After adding everything shakes the mixture well. At last, read the result at 440nm.

RESULT:
Observation Table of Rhizospheric Soil Samples

S. No.	Sample Name	pH	EC	OC	N	P	K	Zn	Cu	Fe	Mn	B	S
1.	AS01	7.75	0.58	0.705	263	9.79	1009.46	0.74	0.44	8.90	5.18	2.48	6.00
2.	AS02	7.55	0.74	0.930	315	11.07	175.05	0.56	0.16	3.80	6.64	3.22	10.00
3.	AS03	8.57	1.16	0.435	180	11.50	560.92	0.50	0.20	2.38	6.82	2.85	3.00
4.	AS04	7.65	0.50	0.225	95	12.78	375.63	0.58	0.54	7.26	6.48	2.02	15.00
5.	AS05	8.46	1.22	0.960	315	12.35	1117.8	0.22	0.20	4.64	4.22	2.66	2.00
6.	AS06	7.75	0.43	0.360	143	18.74	529.18	0.52	0.90	6.80	4.64	2.20	5.00

7.	AS07	7.04	0.67	0.735	263	5.11	451.23	0.68	0.58	11.46	5.64	2.57	2.00
8.	AS08	7.14	0.64	0.885	315	3.40	149.73	0.94	0.46	5.60	8.24	2.85	4.00
9.	AS09	6.94	0.48	0.630	235	2.55	234.45	0.80	0.28	7.80	4.70	2.76	18.00
10.	AS10	7.55	0.38	0.165	47	4.68	237.93	0.42	0.26	6.98	4.98	2.94	37.00
11.	AS11	7.65	0.47	0.450	180	1.70	277.76	0.32	0.40	5.94	5.42	2.57	1.00
12.	AS12	7.35	0.29	0.060	47	4.26	675.9	0.42	0.08	8.72	5.44	3.68	5.00
13.	AS13	7.14	0.45	0.515	200	1.27	151.31	0.54	0.28	5.90	5.62	3.22	8.00
14.	AS14	9.58	1.00	0.615	235	3.83	279.9	0.68	0.36	6.96	5.12	1.10	7.00
15.	AS15	7.75	0.53	0.240	95	5.96	259.08	0.44	0.20	0.74	6.98	1.74	15.00
16.	AS16	7.65	1.04	0.930	315	3.83	968.96	0.50	0.32	3.44	7.40	4.69	5.00
17.	AS17	6.84	0.31	0.675	263	7.66	160.2	0.88	0.52	9.60	4.90	2.94	12.00
18.	AS18	8.57	0.80	0.600	235	5.11	242.88	0.26	0.38	5.62	6.20	4.14	10.00
19.	AS19	6.84	0.38	0.165	325	4.68	203.06	0.76	0.56	7.54	5.40	3.86	4.00
20.	AS20	8.46	0.65	0.480	200	11.07	155.58	0.96	0.68	0.78	6.08	0.34	2.00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8
6
4
2
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AS01
AS02
AS03
AS04
AS05
AS06
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AS15
AS16
AS17
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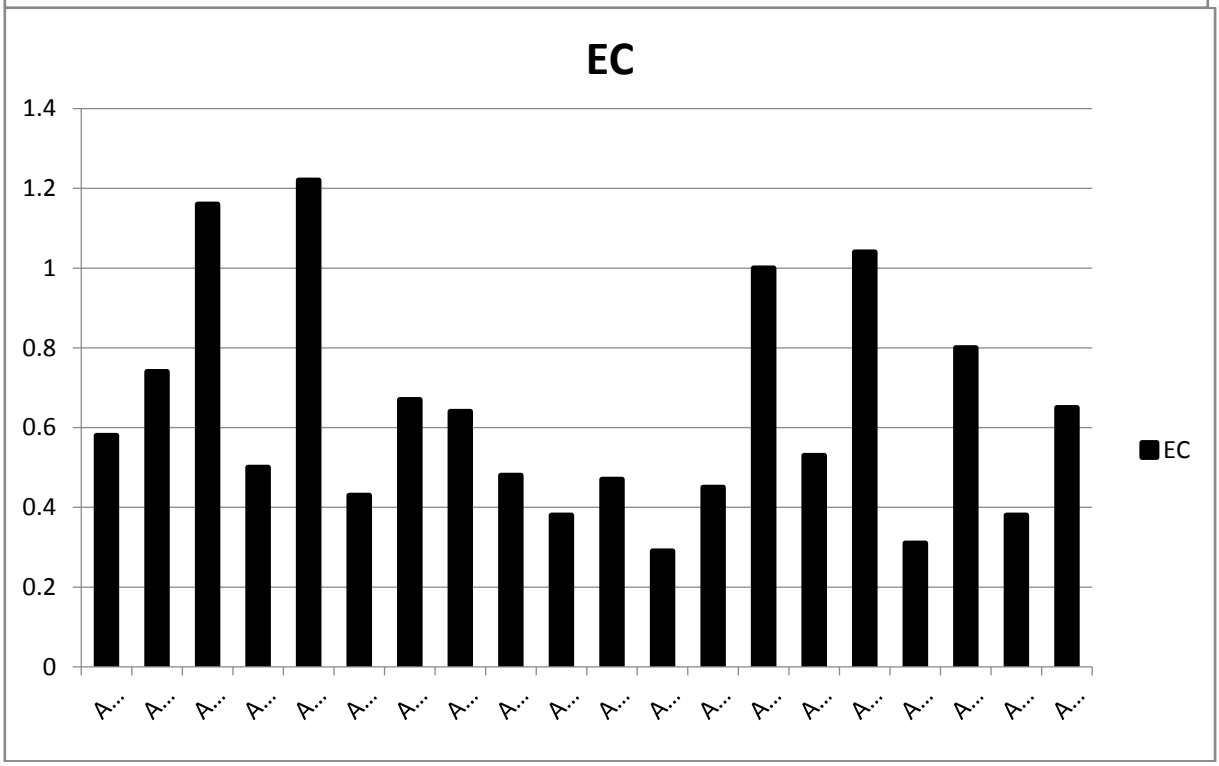
AS19
AS20
pH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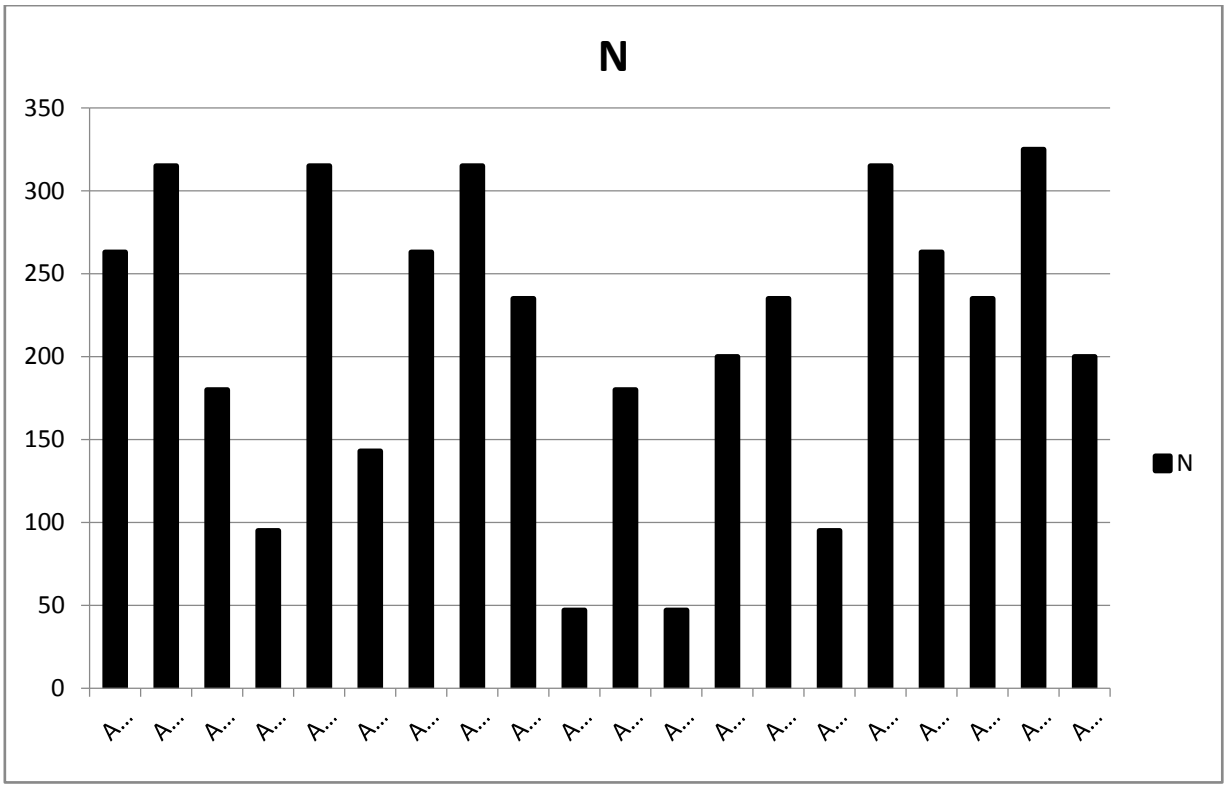
0.4
0.2
0
EC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50
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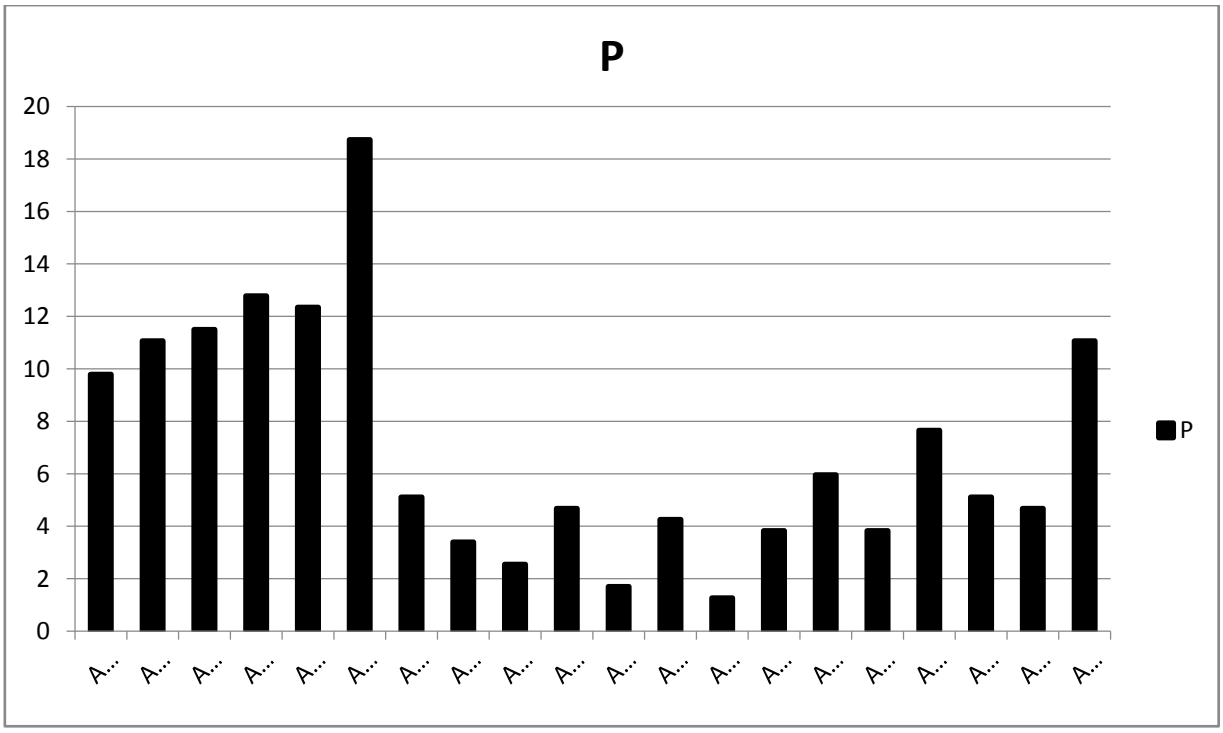
N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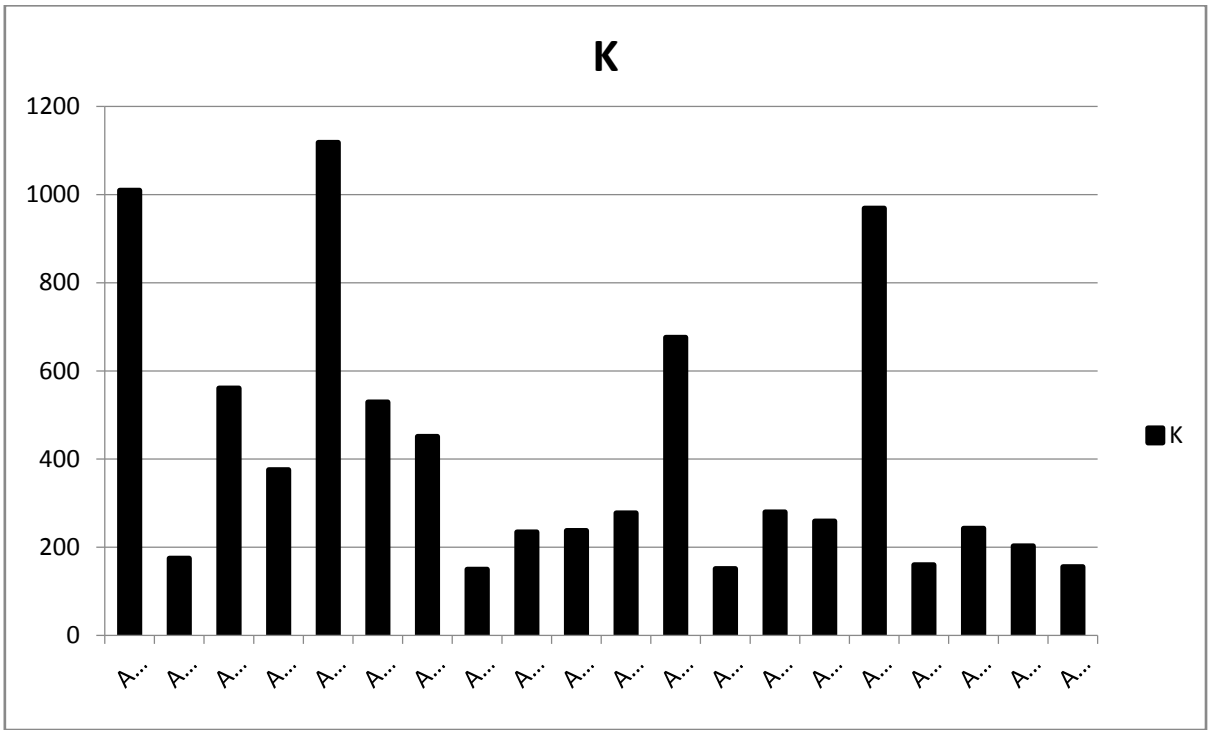
P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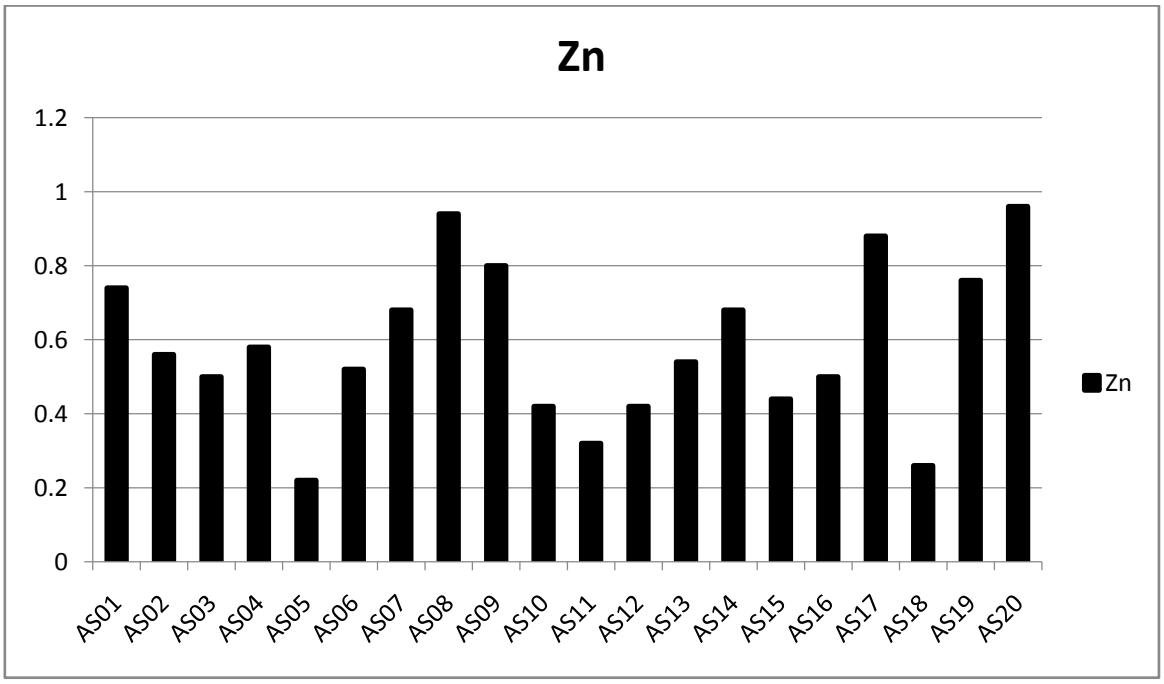
K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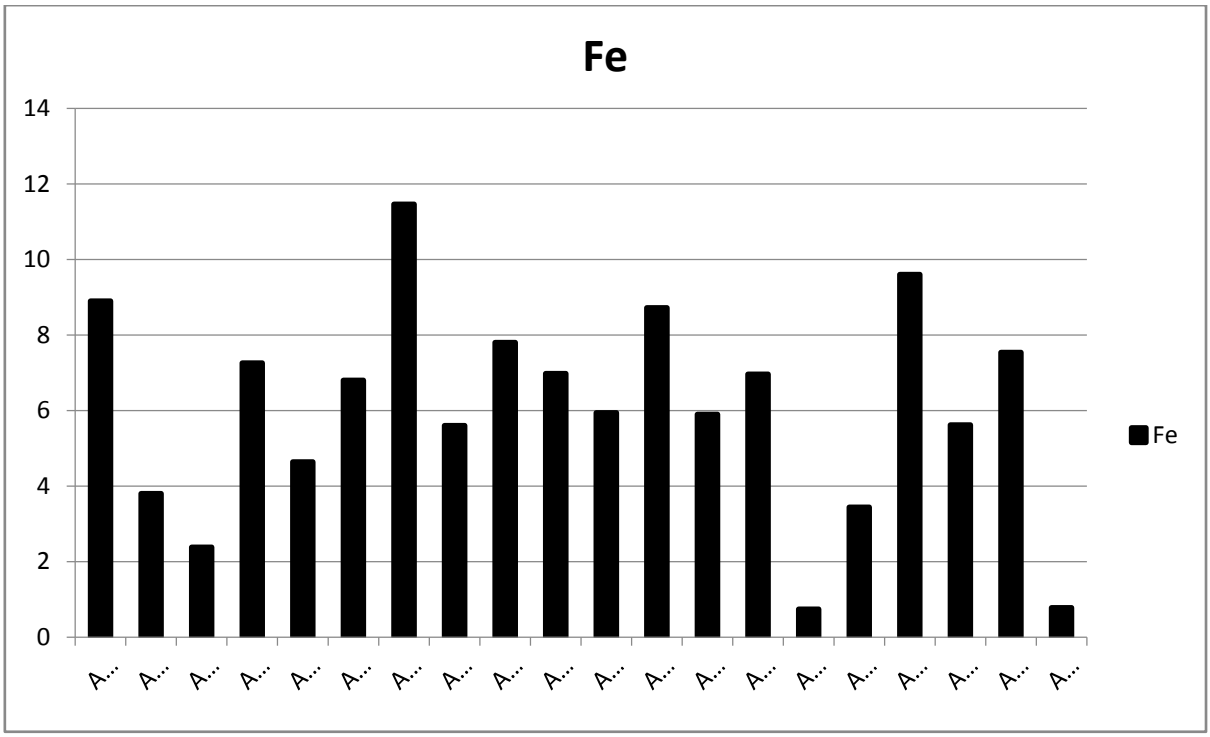
AS19
AS20
Zn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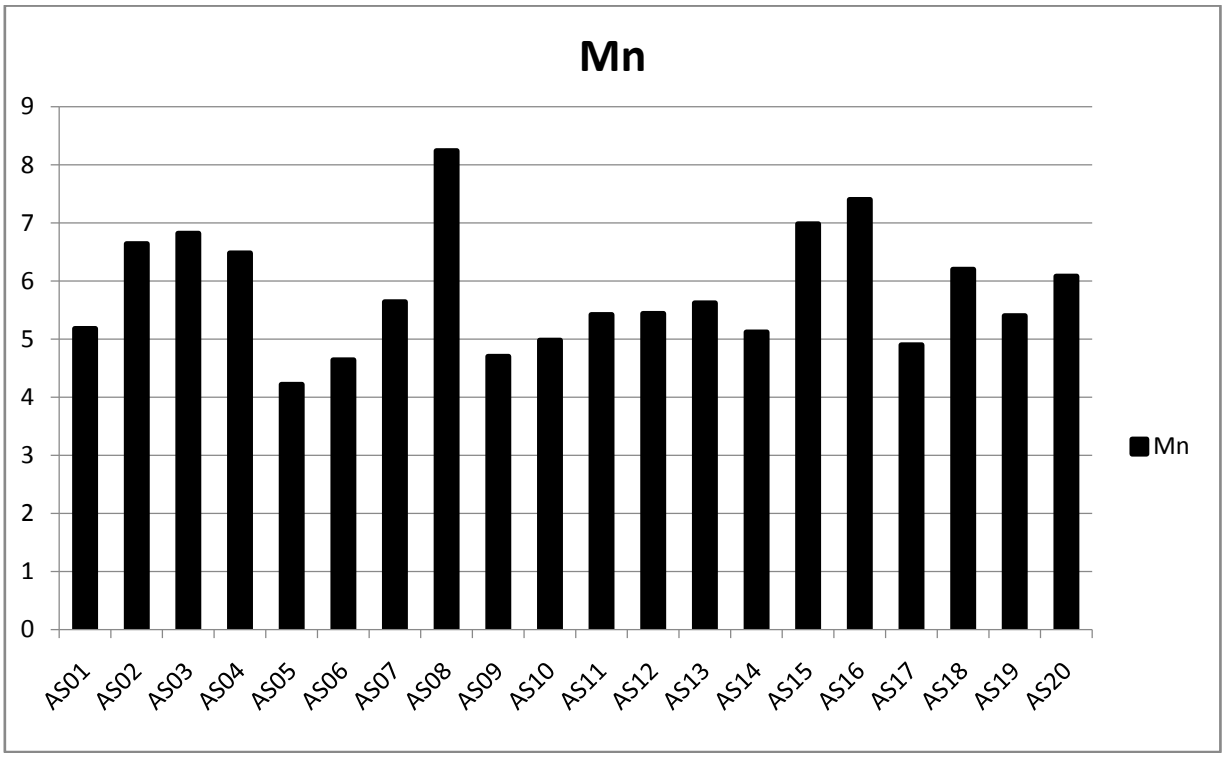
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AS04
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AS09
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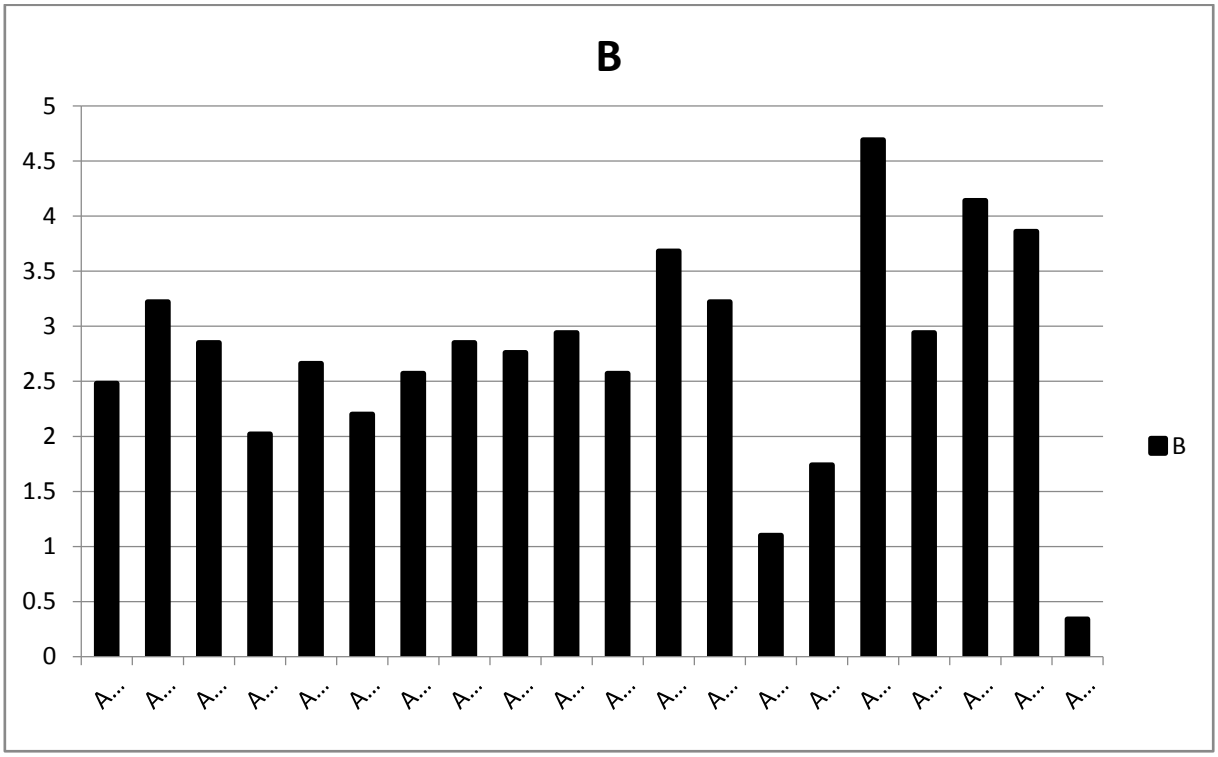
AS15
AS16
AS17
AS18
AS19
AS20
Mn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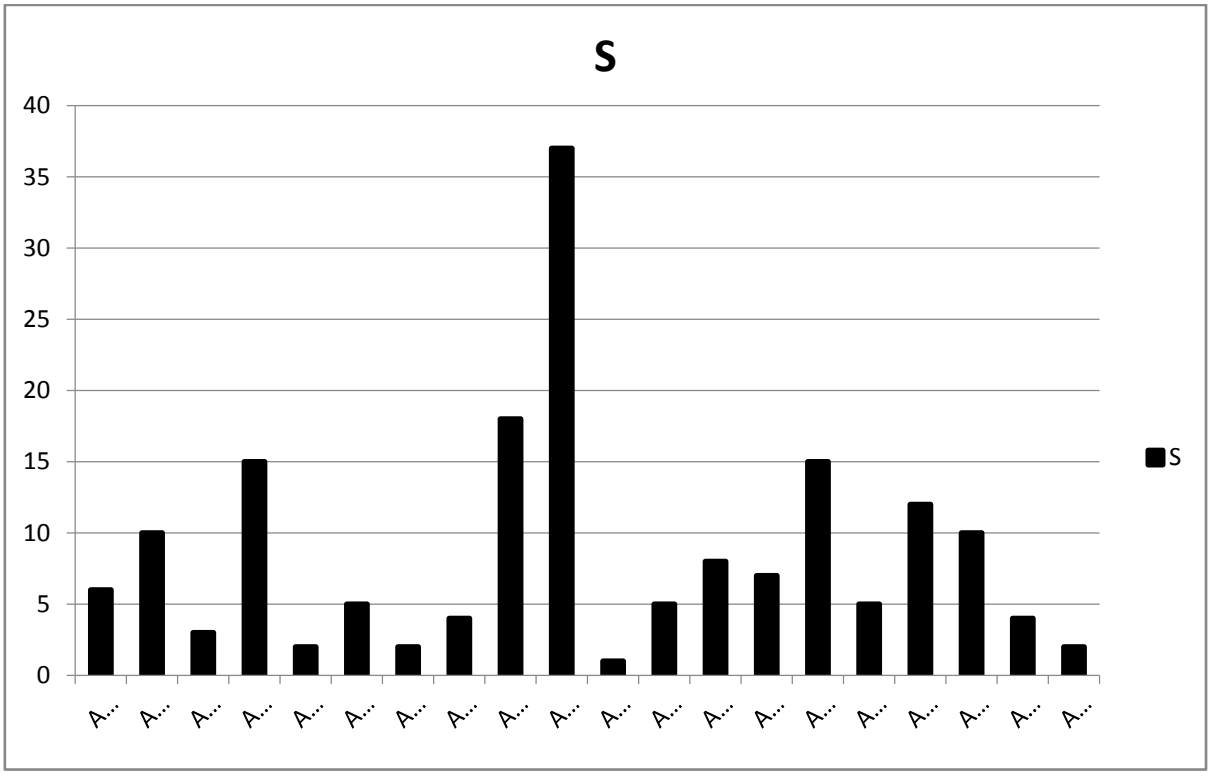
B


S
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25
20
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10
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0
S

DISCUSSION:

Rhizospheric Soil pH, Organic matter, Total Nitrogen and Available Phosphorus The pH of the studied Rhizospheric soils ranged from 6.90 to 7.60. The Rhizospheric soil can be said to be slightly acidic to neutral and this range provides the best growing condition and influences the uptake of nutrients by medicinal plants. Rhizospheric Soil organic matter content is the rich-mineral constituents in the Rhizospheric soils that allows development and growth of plants. It has an important function in Rhizospheric soil texture, water retention and contributes immensely to Rhizospheric soil nitrogen, phosphorus, sulphur, cation capacity and exchangeable cation. The organic matter of the studied soil ranged between O.68 and 0.10 %. The significant amount of organic matter content recorded in the Rhizospheric soils could be ascribed to the decomposition of medicinal plants remains from dead Rhizospheric soil macro fauna and micro-organisms in the reserves. The total nitrogen content in the Rhizospheric soils ranged from 1.35 to 2.66 %, while the values of available phosphorus in the Rhizospheric soil were between 90.92 and 200.22 %. The high values of total nitrogen and available phosphorus (AP) may be attributed to high content of organic matter in the Rhizospheric soil. This may also be credited to their occurrence in organic matter combination with organic carbon. Exchangeable Cations (Na, K, Ca and Mg) the values of exchangeable cations in the studied Rhizospheric soils were Na (0.09 - 0.16 Cmol/kg), K (0.12 -0.26 Cmol/kg), Ca (0.61- 0.98 Cmol/kg) and Mg (0.19-0.24 Cmol/kg). Generally, the relatively low values of exchangeable cations may be ascribed to Rhizospheric soil nutrient losses through anthropogenic activities such as cultivation; harvesting or climatic factors leading to leaching that can prompt mobilization and immobilization of these cations. **iii**. Micronutrients (Fe, Zn, Cu and Mn) the mean values of the micronutrients determined in the Rhizospheric soils followed a decreasing order as Fe > Mn > Zn > Cu. Low values of standard deviation of these elements observed in the Rhizospheric soils are a reflection of low variability in geochemical characterization of the Rhizospheric soil. It was observed that the values were within the recommended standard values for normal Rhizospheric soils.

CONCLUSION:

The study showed that medicinal plants are the most important factors which influence the physicochemical properties of the Rhizospheric soil. Rhizopheric soil plays an important fertility and stability function in forest ecosystems and it directly or indirectly regulates and influences many biological processes. The physicochemical properties of this Rhizopheric soil are determined by chemical, physical and biological processes, which play a key role in determining of the growth of medicinal and its community composition, and individual productivity. The relationships Rhizospheric soil of organic carbon (OC) with other determined parameters in the studied Rhizospheric soils indicated them as important Rhizospheric soil nutrients. The physicochemical properties of Rhizospheric soil were the dominant factors influencing the extent of decomposition process. Thus, the forest reserve serves as protection for the Rhizospheric soil as well as promoting the fertility and productivity of the Rhizospheric soils to support a flourishing medicinal plantation type in the area. Besides, different medicinal plant species tend to have species-specific effects on quality and quantity of this Rhizopheric soil and they also change the physical, chemical, and biological properties of soil. Therefore, understanding the relationships between different types of medicinal plantation and physicochemical properties of Rhizopheric soil are of great significance for the soil and water conservation, nutrient cycling, and soil health assessment of forest stands.

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