

Novel Characterization of Few Medicinal Plant Leaves

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ABSTRACT

The experiment was designed to evaluate the conductivity, pH-values and transmission percent of traditionally used medicinal plant leaves in the form of powder using distilled water with varied physicochemical characteristics. The distilled water hydrogen ion concentration [pH] was neutral [pH 7.0] while the average pH-values of sample code in increasing order TG [7.13], IB [7.22], NM [7.43], BK [7.45] and NR [7.98]. The results indicated that the NR sample water as shown highest pH- value. There was a significant difference in the pH-values of different samples. The temperature increases conductivity increases. Concentration of the sample increases conductivity also increases by conductivity levels was responsible for the biological activity higher in NR than the rest of the samples. There was a positive significant ($p < 0.05$) relationship between the conductivity of the different samples.

KEYWORDS: Conductivity, leaves, pH-values, transmission percent, wavelength.

1. INTRODUCTION

The leaves are the typical plant is the site of photosynthesis for the plant. In recent years traditionally used medicinal plants produce a variety of compounds of known therapeutic properties. Focus on plant research has increased all over the world and immense potential of medicinal plants used in various traditional systems has been highlighted. In recent years, antibacterial properties of Indian medicinal plants have been increased [1]. Plants are showing variation in their morphology, habitat and these are remarkable factors for generation of plant diversity in specific ecological areas. It becomes a major part of further development of biodiversity.

Azadirachta indica leaves possessed good anti bacterial activity, confirming the great potential of bioactive compounds and is useful for rationalizing the use of this plant in primary health care [2]. The leaves of *Murraya koenigii* also consist of protein, carbohydrates, fibre, minerals, carotene, vitamin C. *Murraya koenigii* was one of the medically beneficial plant which has been

used many century ago by our ancestors [3]. In recent years, antibacterial properties of Indian medicinal plants have been increased [4]. Uniyal et al. reiterates a popular local quote of the Bhangalis in the western Himalayan region of India which translates as- "A man cannot die of disease in an area where *vitex negundo* is found" [5]. The bioactive components in curry leaves are oxalic acid, resin, carbazole alkaloids and have significant pharmacological activities [6].

Conductivity of a substance is the ability or transmits heat or power to conduct. The electrical conductivity (EC) can be expressed as reciprocal of ohms (mhos) or as milli Siemens (mS/cm) or micro Siemens (μ S/cm) measured between the opposing faces of 1 cm cube of liquid at a specific temperature. The charge on ions in solution facilitates the conductance of electrical current and the conductivity of the solution is proportional to its ion concentration. The Conductivity depends on the value of the pH, concentration of ions and the temperature of measurement which has been dissolved in the water to form ions. Chemical composition of the sample water determines its conductivity. Thermal conduction is a very important and a major topic in the study of heat transfer. Conduction is the transfer of energy from energetic particles of a substance to the adjacent less energetic ones as a result of interactions between the particles [7]. The electrical conductivity of a water solution is a measure of how much material is dissolved in the water. EC is an important electrochemical water quality parameter. It has been suggested that drinking water quality can be checked effectively by measuring the conductivity of the water [8]. Nature worship has been a key force of shaping the human attitudes towards conservation and sustainable utilization of

natural resources. Such traditional practices have been invariably operating in different parts of India [9]. A previous study has been made widely on curry leaves from its stem up to its bark and, thus this review gathers variety of idea from multifarious research which has been done on curry leave and provides a better cognizance of its therapeutic and non-therapeutic properties [10].

In the present article, the authors present a technique that can be employed for the measurement of the conductivity, pH-values and transmission percent of traditionally used Indian medicinal plants leaves such as *Azadirachata indica*, *Millettia pinnata*, *Murraya koenigii*, *Morinda pubescens* (J. E. Smith) var. *pubescens* and *Vitex Negundo Linn* have been studied using diffusion method. The list of medicinal plant leaves were presented in table-1.

Table-1: List of medicinal plant leaves

S.No	Botanical Name	Family	Common name	Leaves sample code
1	<i>Vitex Negundo Linn</i>	Verbinaceae	<i>Nirgundi</i>	NR
2	<i>Murraya koenigii</i>	Rutaceae	<i>Bergera koenigii</i>	BK
3	<i>Azadirachata indica</i>	Meliaceae	<i>Neem</i>	NM
4	<i>Pongamia pinnata</i>	Fabaceae	<i>Indian beech</i>	IB
5	<i>Morinda pubescens</i> (J. E. Smith) var. <i>pubescens</i>	Rubiaceae	<i>Togarua</i>	TG

2. MATERIALS AND METHOD

2.1 Materials

The leaves extract from *Azadirachata indica*, *Millettia pinnata*, *Murraya koenigii*, *Morinda pubescens* (J. E. Smith) var. *pubescens* and *Vitex Negundo Linn* of the medicinal plants by biological method from the Botanical garden of Rayalaseema University, Andhra Pradesh, India.

2.2 Preparation of composites and sample

All the specimens in this study were air dried in shade at room temperature 29 °C for 10-15 days. The dried leaves were ground into fine powder. Sample powder stored in polyethylene bags. The weight of the sample weighted using digital balance. The different weights of the sample powder were dissolved in 100 ml water. At the end of the 72 hours the extracts were distilled and prepared for different concentrations.

2.3 Experiment

Conductivity is measured with a probe and a meter. A voltage is applied between the two electrodes in the probe immersed in the sample water. The drop in voltage caused by the resistance of the water is used to calculate the conductivity per centimeter. The units of conductivity are Siemens per cm (S/cm). The conductivity (G) is the inverse of resistivity (R) is determined from the voltage (V) and current (I) values according to Ohm's law

$$V = IR \text{ then } G = \frac{1}{R} = \frac{I}{V} \text{ (mho)}$$

Resistance and current is measured by using KITHELY -2700 Models. For % transmission was measured by colorimeter SYSTRONIC Company.

3. RESULTS AND DISCUSSIONS

The physical properties of fluids such as thermal conductivity play an important role in the design of a wide variety of engineering applications, such as heat exchangers. The physical properties of substances are an important subject in many advanced engineering applications. Conductivity measurements are temperature dependent.

The temperature dependence of biological sample was presented in table-2. If the temperature increases, conductivity also increases up to maximum 55 °C and declined after, because of the electrical current is transported by the ions in solution as shown in fig.1 to fig.3. The conductivity increases as the concentration of ions also increases. The distilled water hydrogen ion concentration pH was neutral [pH 7.0] while the average pH-values of sample in

increasing order [TG 7.13], [IB 7.22], [NM 7.43], [BK 7.45] and [NR7.98]. The results indicated that the NR sample water as shown highest pH- value. NR has high pH (7.98) value implies it has antacid potentials present which will be caused by biological infective resistance to human beings. This kind of activity in general found to be rheumatic reluctance for many orthopedically pains. Based on the pH-values the NR plant leaves are showing variation in their morphology, habit and habitat and these are remarkable factors for generation of plant diversity in specific ecological areas. It becomes a major part of further development of biodiversity. Richness of plant diversity is characterized by several factors like presence of favorable environmental condition, plant genetics and capacity of the plants to regenerate itself in natural sites [11]. There was a significant difference in the pH-values of different samples. The average pH-values of the medicinal plant leaves were shown in figure-4.

Concentration of the sample increases conductivity also increases by conductivity levels was responsible for the biological activity higher in NR than the rest of the samples. There was a positive significant ($p < 0.05$) relationship between the conductivity of the different samples shown in figure-5 to figure-9. Figure-10 shows transmission % of leaves sample with variation of wavelength. Maximum absorption found at 550 nm. Table-3 has shown the conductivity of the leaves sample with variation of concentration.

In research observed that NR has hypotes protective activity of ethanolic activity, anti pyrativc of alcoholic activity and anti fungal activity and anxiolytic activity. It is significant that antibiotic activity. A total 48 compounds were detected of which 19 compounds represented 88.65% oil. In figure-5 very high peak may be special character due to this component [12].

The curry leaves have chemical diversity in treatment of dementia syndrome. In fig-1, BK curve indicate very large and

widened flat elevated portion has special significant compare to NR and TG. The acetone extracted oleoresin of curry leaves was evaluated for its anti oxidant activity using a Beta-carotene/ linoieic acid model system. It showed maximum activity of 83.2% at 100mg/L. It also has hypoglycemic activity appears due to glycogenises is evident. Mineral (ZN, Cu, Fe) causes high conductivity [13]. Figure-2, NM reveals the significant presents of main extract Methyl 14-methylpentadecanoate 38.125%. is the cause for the hetic behavior when temp. Varies the conductivity decreases. The evaluation of antioxidant capacity of different crude extracts was in the order of chloroform > butane > ethyl acetate extract > hexane extract > methanol extract [14]. The fig-3 the plot indicates special peak upright. Crude decoction of derived leaves IB was evaluated for it anti microbial effect. It has selective anti diarrheal action with efficacy against chloral and causing bloody diarrhea episodes [15].

Many of the existing synthetic drugs cause various side effects. Hence, drug development plant based compounds could be useful in meeting this demand for newer drugs with minimal side effects. The extracts of neem when used as medicinal plant, could be useful for the growth inhibition of the carcinogenic bacterium [16]. The Neem tree is duly valued worldwide for its hardiness, medicinal properties, and nutritional value. *A. indica* (leaf, bark and seeds) are known to contain antibacterial and antifungal activities against different pathogenic microorganisms; in addition to antiviral activity against vaccine, chikungunya, measles, and Coxsackie B viruses [17]. In traditional system of Ayurvedic medicine *Pongamia pinnata* has been widely used as curative agents for variety of ailment [18]. The role of traditional medicines in the solution of health problems is invaluable on a global level. Medicinal plants continue to provide valuable therapeutic agents, both in modern and in traditional medicine [19]. Research work on medicinal plants has intensified and

information on these plants has been exchanged. This research will go a long way in the scientific exploration of medicinal plants for the benefit of man and is likely to decrease the dependence on synthetic drugs.

In recent times, focus on plant research has increased all over the world and immense potential of medicinal plants used in various traditional systems has been highlighted. In Ayurvedic medicine, curry leaves are believed to have several medicinal properties such as anti-diabetic, antioxidant, antimicrobial, anti-inflammatory, anti-carcinogenic and hepato-protective properties [20]. The fresh leaves are burnt with grass as a fumigant against mosquitoes. Decoction of leaves may improve eyesight [21]. Traditionally used Indian medicinal plants leaves such as *Azadirachata indica*, *Millettia pinnata*, *Murraya koenigii*, *Morinda pubescens* (J. E. Smith) var. *pubescens* and *Vitex Negundo* Linn have been used for diabetic and various ayurvedic medicines.

Table-2: Temperature versus conductivity of the leaves sample

Temperature °C	Conductivity (mS/cm)				
	N R	BK	TG	IB	N M
30	1.976	2.501	4.424	1.020	25.000
35	2.304	3.584	5.263	1.234	15.873
40	3.184	5.263	9.259	11.363	8.771
45	3.937	8.130	13.513	13.513	5.780
50	4.545	13.157	18.867	27.777	4.716
55	4.202	21.833	38.461	50.000	4.310
60	3.875	20.739	27.027	25.000	4.608
65	3.030	17.857	20.118	71.428	5.235
70	2.439	11.662	13.513	13.513	12.500
75	1.760	9.528	11.627	7.633	7.299

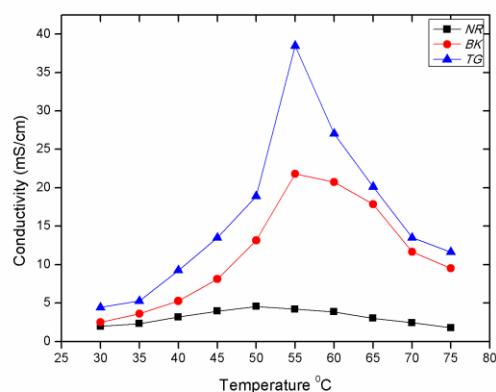


Figure-1: Temperature versus conductivity of the NR, BK and TG sample

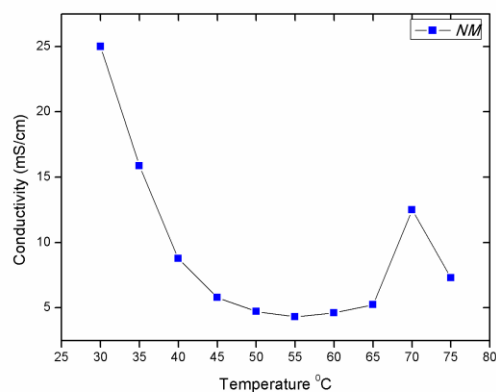


Figure-2: Temperature versus conductivity of the NM sample

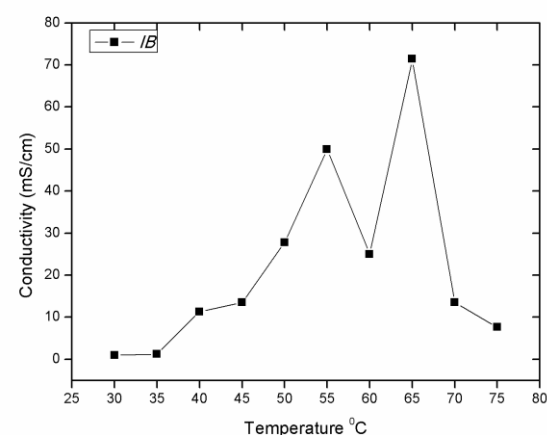


Figure-3: Temperature versus conductivity of the IB sample

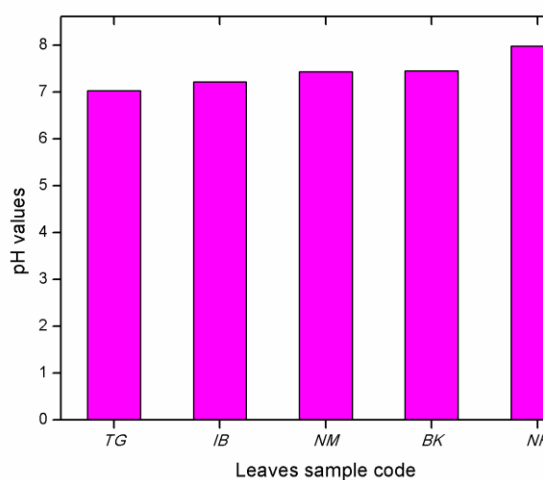


Figure-4: pH - values of the leaves sample

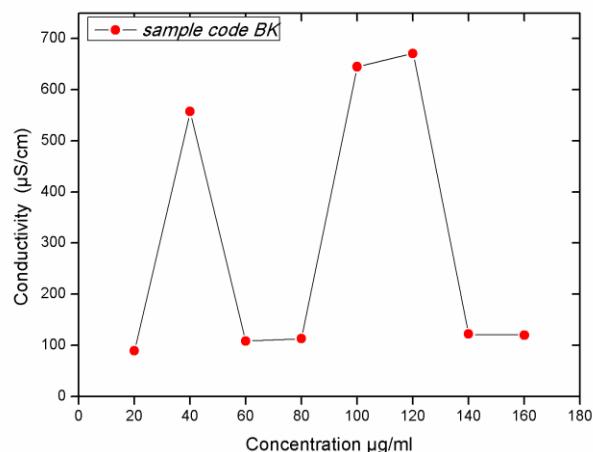


Figure-6: Concentration versus Conductivity of BK sample

Table-3: Concentration versus conductivity of the leaves sample

Leaves sample concentration µg/ml	Conductivity (µS/cm)				
	TG	IB	NM	BK	
20	2012.00	82.00	112.00	89.00	10.00
40	2427.00	80.00	114.00	557.00	10.00
60	2171.00	389.00	118.00	108.00	10.00
80	2673.00	1866.00	132.00	113.00	98.00
100	1041.00	735.00	129.00	645.00	10.00
120	1600.00	741.00	137.00	671.00	160.00
140	1686.00	3277.00	132.00	122.00	118.00
160	849.00	835.00	137.00	120.00	149.00

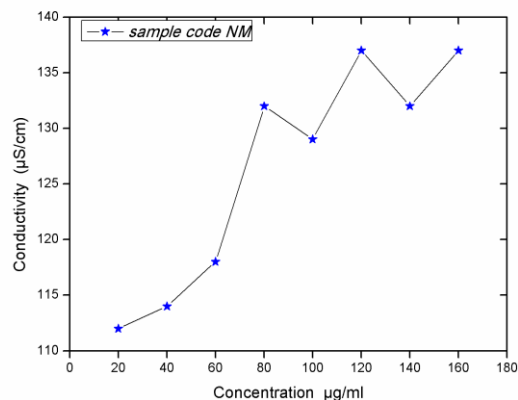


Figure-7: Concentration versus Conductivity of NM sample

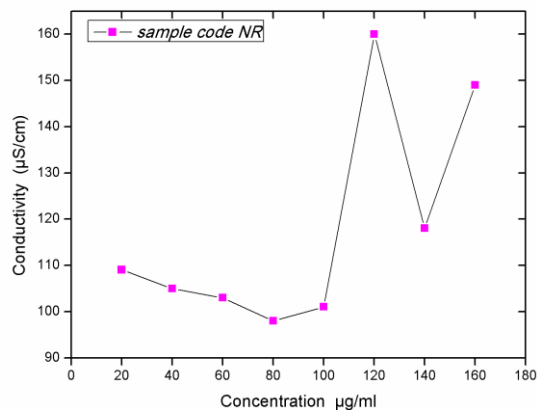


Figure-5: Concentration versus Conductivity of NR sample

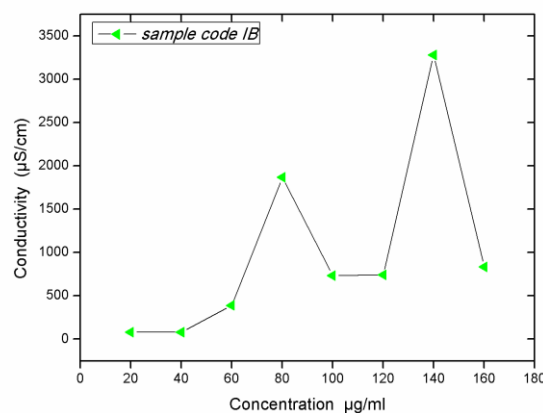


Figure-8: Concentration versus Conductivity of IB sample

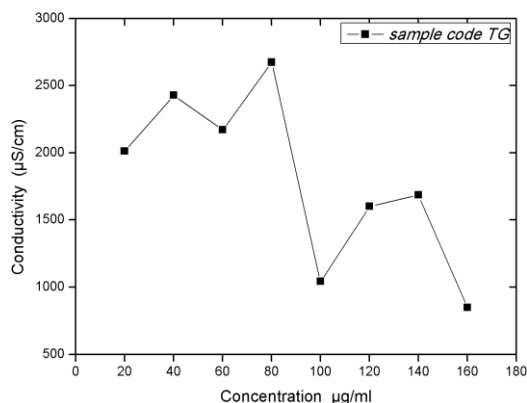


Figure-9: Concentration versus Conductivity of TG sample

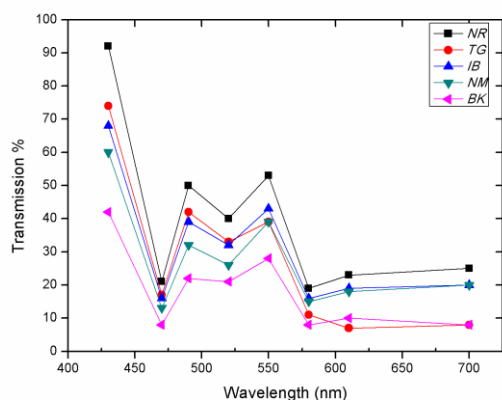


Figure-10: Transmission % of leaves sample with variation of wavelength.

4. CONCLUSION

The diffusion method enables the measurement of the electrical properties of liquids inaccessible by classical high-accuracy techniques. Conductivity measurements are widely used in industry. Conductivity is also used to monitor the buildup of dissolved ionic solids in evaporative cooling water systems and in boilers. Based on the pH-values the NR plant leaves are showing variation in their habit and habitat e are remarkable factors for generation of plant diversity in specific ecological areas. It becomes a major part of further development of biodiversity. Concentration of the sample increases conductivity also increases. A conductivity level was responsible for the biological activity higher in NR than the rest of the samples. There was a positive significant (p

< 0.05) relationship between the conductivity of the different samples. Maximum absorption found at 550 nm in all the investigated samples.

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