

EFFECT OF POLLUTION ON GREEN LEAVES

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Green leaves are the subjects of study for all types of researchers since long time. The modern theories find electric currents in the green leaves.[1,2,3] There is battery in every green leaf at the junction of petiole and body of the leaf. This battery is charged in the presence of the sun.in the daytime and supplies electric current in the nighttime to the entire body of the green leaf. Electric current is the life in every Bio-system The free electrons give life to the bio-system and keep it alive and alert all the time This is the excitation. The microorganism come in the way to complete the path of electric current and water current if there is any gap of open circuit in the leaves. The flow of current of electron and water is made by microorganisms in the green leaves sand entire plant. These tiny particles die in the pollution of severe nature and the green leaves become pale and perforated. No. electric current and water current flow in the leaf body, the quality of a green leaf is impaired and this can be found by measuring the Q factor of leaf or the loss tangent using

LCR tand digital meters. The electrical measurement can predict the response of green leaves under the microorganism such as Algae, Fungi, Bacteria, Protozoa and viruses.

3.1.1 Pollution smong and green mango leaf

The ingredients of common air pollution [4] can be explained as follows:

$F(Z) = (H_2, He, CH_4, NH_4, H_2O, C_2H_2, CO, N_2, C_2H_4, Air, NO, O_2, H_2S, Ar, HCl, CO_2, N_2O, C_2N_2, SO_2, Cl_2)$

The failure rate is represented by λ_2 and λ_3 . The failure rate by λ_2 stands for a green leaf and λ_3 for gases. One can find the probability indices of the pollution named as Density, Melting, point, Boiling point. specific heat of latent evaporation, specific heat capacity, cubic expansivity, Thermal conductivity, Surface tension, viscosity refractive index, bulk modulus of rigidity. One can take interest in the failure rate of these parameters for liquid pollution and mango leaf.

Table 3.1 R.A.F. Liquid pollution

Parameter	λ_1	λ_2	λ_3	R	P	(λ)	(λR)	Security
Density	0.0003	0.226	0.665]	0.410	0.589	0.892	0.365	0.634
Melting Point	0.0043	0.00215	-	0.993	0.0064	0.00645	0.0064	0.9935
Boiling Point	0.00247	0.0042	0.006	0.987	0.0126	0.126	0.012	0.987
Latent Heat Of Evaporation	0.01375	0.068	0.140	0.8011	0.1988	0.221	0.1592	0.840
Specific Heat Capacity	0.000505	0.000312	0.00034	0.998	0.0011	0.00116	0.00115	0.9988
Cubic Expansivity	0.01	0.002	-	0.988	0.012	0.012	0.0118	0.988
Thermal Conductivity	0.902	0.321	02	0.288	0.711	1.243	0.358	0.672
Surface Tension	0.0066	0.0026	-	0.9914	0.0085	0.086	0.00852	0.991
Viscosity	0.30	0.162	0.071	0.586	0.413	0.533	0.312	0.687
Refractive Index	0.65575	0.212	-	0.419	0.580	0.867	0.363	0.636
Bulk Modulus	0.2086	0.106	-	0.730	0.2699	0.3146	0.229	0.770
	pollution liquid	Mango leaf	Gases pollution					

The λ_1 is total failure and calculates reliability R and probability of failure p in the harsh environment. The $\lambda_1, \lambda_2, \lambda_3$ are failure rates of liquid pollution, mango leaf and gaseous pollution, and gaseous pollution respectively. The liquid pollutant would be

($C_4H^{10}O, C_3H_6O, C_2H_6O, Parafeen\ Oil, C_7H_8$ turpentine C_6H_6 , olive oil, H_2O , sea water, $C_2H_4O_2, C_6H_6O, C_6H_5NO_2, C_3H_2O_3, CS_2, CHCl_3, CCl_4, Br, Hg$)

The failure rate of the properties parameters is marked by λ_1 which is inversely proportional to the parameter. The table above show that the thermal conductivity has highest probability of failure, which is very hazardous.

3.1.2 Characteristic of microorganism and their failure rares in the green leaf

Microorganism are available on the green leaf of mango and can be determined by electrical resistivity

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(P), dielectric constant (ϵ_r), magnetic permeability (μ_r) loss tangent ($\tan\delta$), thermal conductivity (Tc) and relative density. Microorganisms form a mixture of Algae, Fungi, Bacteria, Protozoa, and viruses. In the opinion of environmentalist. the group is found in any

one of them. Most often the Algae has all the components. It is difficult to find their ratio but they are all equally distributed. One can find their electrical parameters as follows:

	D	r	ϵ_r	μ_r	$\tan\delta$	Tc	m	λ_D	R	P
Algae	0.662	80.2	70	0.991	0.012	0.612	0.002	1.51	0.220	0.779
Fungi	0.826	79.2	80	0.986	0.086	0.591	0.006	1.21	0.298	0.700
bacteria	0.726	59.6	90	1.20	0.79	0.662	0.001	1.377	0.2522	0.740
protozoa	0.889	69.4	60	0.999	0.48	0.712	0.008	1.12	0.3246	0.67
viruses	0.623	99.8	50	0.996	0.59	0.736	0.0072	1.605	0.200	0.79

The failure rate of microorganism with density will be 1.176 and reliability to survival will be 0.308 and probability of failure 0.6916. The microorganisms are light and float on the water surface. They are found on the surface of the leaves. They help the leaves and eat the leaf also. The pollution of the above nature marked with the failure rate can be represented by the Fuzzy cardinality and the Fuzzy relative cardinality assuming the failure rates as the

Fuzzy membership functions. [5]

$F(\lambda_1) = (0.0003, 0.0043, 0.00247, 0.01375, 0.000505, 0.01, 0.902, 0.0066, 0.30, 0.65575, 0.2086)$

$F(\lambda_2) = (0.226, 0.00215, 0.0042, 0.068, 0.00032, 0.002, 0.321, 0.0026, 0.162, 0.212, 0.106)$

$F(\lambda_3) = (0.665, 0, 0.006, 0.140, 0.00034, 0, 0.02, 0.071, 0, 0)$

The fuzzy cardinality of $F(\lambda_1)$ $F(\lambda_2)$ $F(\lambda_3)$ may be found using

$|A| = \int_{i=1}^i \mu_A(X) dx$ and $1/n \int_{i=1}^i \mu_A(X) dx = ||A||$

$F(\lambda_1) |A| = 2.1042$ and $F(\lambda_1) ||A|| = 0.1912$

$F(\lambda_2) |A| = 1.1062$ and $F(\lambda_2) ||A|| = 0.10057$

$F(\lambda_3) |A| = 0.90234$ and $F(\lambda_3) ||A|| = 0.0820$

The fuzzy intersection of (λ_1) and (λ_2) would be

$\mu_{\lambda_1} \mu_{\lambda_2} = 0.10057$; $\mu_{\lambda_1} \mu_{\lambda_2} = 0.1912$

$\mu_{\lambda_2} \mu_{\lambda_3} = 0.10057$; $\mu_{\lambda_2} \mu_{\lambda_3} = 0.1912$

The failure rate of microorganism may be $\lambda_4 = 1.176$

The min $\lambda = 1.276$

The max $\lambda = 1.3672$

Rmax = 0.27915, Pmin. = 0.7208

Rmin = 0.2548, Pmax. = 0.7452

The probability of failure of mango leaf with microorganisms would be 72.08% and 74.52%. This is very high and leaves are damaged.

3.1.3 Green leaf is a conductor material.

The green leaf is a conductor; all green leaves are like and have an electrical resistance of 1MW to 20 MW. and resistivity 100W-m Being a high resistance, the current flow is about 1m A to 20 m A. It is an insulator and works as conductor due to water being

65% Other liquids are lignin, tanning oils, Vaseline The pollution is absorbed through stomata and prevents flow of electric current in the various parts. The conductor part is 66% dielectric 22% and 12% semiconductors.

The pollution is spread on the surface and penetrates in a long run to the leaf. The gases are highly hazardous for the leaf. Condition work should not be stopped. The green leaf can work as a rectifier, amplifier, antenna, modulator, electric generator and even a pollution indicator. Green leaf can radiate electromagnetic rays and affect other things to make them fertile. There is every possibility that pollution can enter into the battery of the green leaf and it may die, because no electric current can be generated in the battery.

3.1.4 Response of green leaves under pollution

The response can be explained in terms of dielectric constant of the leaf. The dielectric of a green leaf is about 50 to 60, if it has a water content 65%. The pollution NO_2 , CO_2 , SO_2 , H_2S , HCl , NH_4 , CH_4 , N_2O_2 , can dry the leaf to reduce the water content to 30% and leaf will no doubt die. The CO_2 consumption is slow which is the food for the green leaves. A good green leaf has

Cellulose = tannin = lignin = water = resin = minerals

This balance is distributed and the formation of wood, fruits, flowers are distorted and production is reduced. How this is done and what is the mechanism behind this? The dielectric constant is reduced, therefore the capacitance is reduced. The charge Q is reduced

$$C = \epsilon_0 \epsilon_r A/d$$

$$Q = CV$$

The charge is the electric current and life of the leaf Table 1 represented some of the green leaves flowers and fruits with their measure D, ρ , ϵ_r , μ parameters.

Table-1

Name of leaf	D _{g/cm3}	D _{pg/cm3}	ρΩm	P _p	ξ _r	ξ _{rp}	μ _r	μ _{rp}	RMΩ	LμH	CμF
Mango	0.878	0.926	50	70	80	56	0.992	1.2	2.5	100	100
Mahua	0.782	0.821	60	80	70	60	1.00	2.00	3.5	500	200
Bergad	0.826	0.921	70	90	60	40	1.002	1.002	4.5	300	300
Peepal	0.921	1.00	100	100	40	30	1.00	1.00	1.2	400	400
Jamun	0.662	0.821	40	60	44	36	2.5	2.5	1.4	500	150
Akava	0.776	0.926	60	70	45	38	2.6	2.6	1.5	100	160
Ashok	0.821	0.921	90	100	48	38	1.002	1.002	1.8	200	250
TesuManjha	0.7210.826	0.8360.921	7565	8090	4950	39401.0061.005	1.0061.005	23	300400	350400	
Kauju	0.921	1.00	76	90	60	50	2.0	2.0	4	500	00
Neelgiri	0.668	0.821	78	86	70	56	2.5	2.5	6	600	300
Flowers	D _{g/cm3}	D _{pg/cm3}	ρΩm	P _p	ξ _r	ξ _{rp}	μ _r	μ _{rp}	RMΩ	LμH	CμF
Rose	0.22	0.32	20	30	20	12	1.002	1.002	1	20	2
MorningGlory	0.32	0.42	30	40	30	15	1.002	1.002	2	30	3
Mogara	0.211	0.312	10	12	25	14	1.002	1.002	3	40	4
Bagranda	0.216	0.321	25	30	22	12	1.0002	1.002	0.8	50	6
China Rose	0.226	0.332	12	22	20	1.5	1.5	1.5	0.6	100	8
Fruits	D _{g/cm3}	D _{pg/cm3}	ρΩm	P _p	ξ _r	ξ _{rp}	μ _r	μ _{rp}	RMΩ	LμH	CμF
Mango	0.667	0.772	5	6	80	60	2	2	0.5	50	1
Papita	0.772	0.821	10	12	70	50	3	3	0.4	60	2
Guava	0.552	0.721	15	20	60	40	4	4	0.3	40	3
Ber	0.226	0.321	3	8	62	32	4.5	4.5	0.2	80	4
Jamun	0.326	0.426	9	12	65	35	5	5	0.6	90	6
Grapes	0.236	0.326	8	11	75	40	6	6	0.5	70	7
Tendu	0.446	0.521	11	14	70	50	7	7	0.9	40	8
Mahua	0.662	0.726	12	16	68	58	3	3	1	60	9

The electrical parameter are very approximate and measured by meters and calculated assuming the presence of the above two smong of gases and liquid particles The parameter D, ρ, ξ_ω, μ_{rp} are density, resistivity dielectrical constant, magnetic permeability and are given as the average value of normal green leaf and polluted green leaf as D_p, ρ_p, ξ_{ωp}, μ_{rp} The R,L,C Parameter are also marked measured by LCR tand digital meter.

D	Par	λ	R	P	λR	A
P	0.876	1.141	0.3193	0.6806	0.3643	0.8684
ξ _r	50	0.02	0.98019	0.0198	0.0196	0.3753
μ _r	70	0.0142	0.9858	0.0141	0.0139	0.3731
	1.2	0.833	0.4345	0.5654	0.362	0.8462
D _p	Par	λ	R	P	λR	A
D _p	0.968	1.033	0.3559	0.6441	0.3676	0.9675
P _p	70	0.0142	0.9858	0.0141	0.01399	0.3731
ξ _{rp}	60	0.0166	0.9834	0.0165	0.01632	0.3740
μ _{rp}	2.6	0.3846	0.6807	0.3192	0.2618	0.5402

Quality factor of the green leaf of mango under microbial pollutants—Large number of green leaves were taken as the sample to measure their resistance, inductance, capacitance and loss tangent to find response of the green leaves under pollution hazards especially the microbial pollutants in their availability

. The resistance is important and more important are the quality factor Q of the dielectric material like the green leaf f - Factor can be directly measured by electronic Q- factor meter or by tand digital meters Table 2 represented the R,L, and Q- factor of some green leaves. The microorganisms like Algae, Fungi, Bacteria, protozoa and viruses are always available on smooth surface of all the green leaves. The surface on the green leaf is washed an microorganisms are seperated by an abrasive material. The water containing the mixture of microorganisms is kept aside and its RLC tand parameter are measured by immerging a parallel plate capacitor. The presence of microorganisms may be found There may be dust. filth and smokes on the leaf surface that will be seperately washed out. The quality of the green leaves is impaired in the presence of the microorganisms pollutants. The RLC tand parameters are increased. The dead microorganisms have high resistance. The dry leaves have extremely high resistance. The results may be verified using water content in the green leaf as 50% The measured result tally with the calculated result because green leaves are the mixture of water and earth and air. If pollution is mixed, it is also a mixture of the earth, air, water, and earthly materials.

Table-2

Name of leaf	$R_{m\Omega}$	$L_{\mu H}$	$C_{\mu H}$	tand	Qfactor	R_m	L_m	C_m	tan δ_m	Qmfactor
Mango	5.2	100	200	0.086	11.62	7.2	200	400	0.126	7.936
Eucalyptus	2.6	200	300	0.096	10.416	3.6	300	500	0.1267	7.892
Ashok	20.6	3000	4000	0.0996	10.04	25	4000	6000	0.186	5.376
kadam	10.8	200	300	0.0886	11.286	12	300	600	0.211	4.739
Mahua	2.2	100	150	0.0968	10.330	4.2	200	300	0.234	4.273
Banana	1.5	50	200	0.09668	10.343	3	400	300	0.126	7.936
papitta	2.5	60	100	0.0662	15.105	3.6	120	200	0.216	4.63
kanju	10	56	88	0.0889	11.248	15	100	150	0.186	5.376
Nimbu	15	66	76	0.0996	10.04	20	120	100	0.187	5.347
Manjha	3.6	70	86	0.0892	11.21	6.6	100	96	0.192	5.208
Kosham	9.6	100	200	0.0962	10.395	12	200	300	0.186	5.376
Tesu	10	150	150	0.0872	11.46	20	300	400	0.169	5.917
Emly	2	200	300	0.0962	10.395	6	300	400	0.126	7.936
Morning glory	2	200	500	0.870	11.494	4	300	700	0.162	6.1728
Rose	0.22	25	20	0.112	8.928	0.332	50	40	0.221	4.52
Mongra	0.33	30	15	0.226	4.42	0.462	60	30	0.321	3.115
Bagranda	0.246	20	30	0.116	8.62	0.446	30	40	0.226	4.42
Kaner	0.212	22	40	0.196	5.102	0.521	28	60	0.326	3.067
Chameli	0.213	26	50	0.126	7.936	0.421	50	100	0.221	4.52
China rose	0.226	28	70	0.122	8.196	0.621	40	150	0.312	3.205

Discussion—A systematic study of green leaves is made under various pollutants like gaseous, liquid, particles and microbial pollutants. The electrical parameter can indicate the response quickly and any change can be predicted at once. The green leaf quality if impaired may be defined using the dielectric Q-factor

or loss tangent. The uncertainty of microorganisms can be found using Fuzzy logic grades of truth. The green leaves can work as pollution indicator, diverter, absorber, attenuator, adsorber and arrester. These qualities may be defined using R, L and C parameters.

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