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# Electromagnetic field frequency memory in water as revealed by germination responses of fungal spores

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## ABSTRACT

Electromagnetic field frequency memory in water was verified by recording the germination responses of different fungal spores. There is sufficient evidence that water exposed to electromagnetic (EM) field undergoes structural changes and the water remembers the field memory for extended period of time as discovered by some eminent Scientists. However, there is no consensus of opinion among the scientists in this respect. This paper attempts to obtain some consensus of opinion among the Scientists in this respect by using some validated experimental data.

Key words: Electromagnetic Fields, Memories, Fungal Spores, Germination Responses, Latches, Capacitors, Radiation-Treated Water, Circuitries.

## INTRODUCTION

In digital electronics, the basic building blocks of memories are flip-flops, gates and/or capacitors (See figure 1).

Referring to figure 1, one can see that there are feedback and feedforward connections which form a storage element, and tracking of fields (data) by the dielectric material. Electromagnetic radiation can be trapped within water molecules in much the same way as electric fields are trapped and stored within the dielectric placed between the two metal plates of a capacitor [1].

In this paper, we will prove experimentally that an electromagnetic radiation introduces some virtual dielectrics and some feedback connections in between the water molecules. Therefore, the electromagnetic radiation – treated water exhibits some memory characteristics as revealed by the slowing down or speeding up of the germination of various kinds of fungal spores.

#### THEORY

The microwave radiant energy (hf) incident on the air-water/nutrient interface is converted into a capacitive energy by a process known as capacitive-trap-conversion [2]. This capacitive energy, in turn, is converted to electron-volt energy which gives rise to latent water waves with a characteristic threshold energy which controls the osmotic inflow of water and nutrient molecules into the fungal spores for growth [3].

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When the angular frequency (w) of the latent water waves is below the threshold value,  $w_{thr}$ , the growth of the fungal spores is retarded by reducing the osmotic inflow of water and nutrient molecules into the fungal spores. On the other hand, when the value of w is above  $w_{thr}$ , the growth of the fungal spores is accelerated by increasing the osmotic inflow of water and nutrient molecules into the fungal spores. However, it is observed that if  $w = w_{thr}$ , then the growth of the fungal spores is normalized. The following energy conversions take place during the process under discussion:

Microwave Radiant Energy => Capacitive Energy => Charge-Volt Energy => Osmotic Pressure Energy.

In equation form, we have:

 $hf(=hc/\lambda) => 0.5 \text{ CV}^2 => qV(=neV) => 0.5 \text{ Ma}^2 \omega^2 => P_{os}.V_{sp}$ 

where:

h = Planck's constant;

f = Frequency of the microwaves used;

c = Velocity of light;

 $\lambda$  = Wavelength of the microwave used;

C = Capacitance of the water- nutrient dielectric;

V = Potential across the water- nutrient dielectric;

q = n. e as the charge developed;

M = Average mass of a water – nutrient molecule;

a = Average displacement of vibration;

 $\omega$  = Mean angular frequency of oscillation of the latent water wave;

 $P_{os}$  = Osmotic pressure developed across the fungal spore membrane;

 $V_{sp}$  = Average volume of a fungal spore.

#### MATERIALS AND METHODS

To examine the modulation frequency memory in water, water samples were irradiated as follows for investigating the germination responses of fungal spores to 9.575 GHz microwave amplitude - modulated with square waves of different pulse repetition frequencies.

Experimental set up for exposure is shown schematically in fig. 2. The microwave source was an X - Band Klystron which was adjustable from 8 to 10 GHz. The power amplifier of the circuit used is 8349 B (2-20 GHz, 20 dBm). The system employs microwave power amplifier 8761 A, 8481H power sensor and 436 A power meter obtained from HEWLETT PACKARD CO., USA. The rest of the equipments/components were obtained from ECIL Hyderabad, by order. The frequency of the microwave was set at 9.575 GHz. Twelve test tubes each containing 10 ml sterilized water were taken in each of the two treatment groups-control and experimental. Six equal subgroups with two test tubes of samples in each were formed in each treatment groups. Six subgroups of test tubes containing experimental water samples were exposed to 9.575 GHz microwaves modulated with square waves of different pulse repetition frequencies of 1000 Hz, 700 Hz, 500 Hz, 200 Hz, 100 Hz and 50 Hz respectively each at incident power density of 1.633 mW/cm<sup>2</sup> continuously for one hour in the near field of an X - Band Horn Antenna whose aperture area was 72.0cm<sup>2</sup>. The distance between the antenna aperture and the water samples was 6 mm. Same number of test tubes containing control water samples were kept in the same room with the source, but isolated from exposure to microwave. 20 dB directional coupler and power meter were used to measure the incident power. Reflected powers were estimated by the use of power sensor and meter in the third port of circulator.

A larger aperture horn in Fresnel region and power sensor and meter were used to measure the power transmitted through the samples. Power absorbed by the experimental samples were determined by calculating the differences in transmitted and reflected powers under two conditions (empty test tubes in one and the filled test tubes in the other). The absorbed power density for each of the subgroups of experimental water samples is 2.312 mW/cm<sup>2</sup>.

All the fungi: Alternaria tercicum, Helminthosporium oryzae and Ustilago cynodontis were isolated from their respective host plants on potato dextrose agar (peel potato 250 gm + dextrose 20 gm + agar 20 gm) medium.

			A. ten.	A. alt.	F. udum	U.cynodontis	H.turcium	H.oryzae
Control			$83.05 \pm 1.01$	86.25 ±2.46	86.47 ±3.53	88.46 ±3.17	$85.26 \pm 3.48$	$89.00\pm7.65$
Freq.	Inc.Power Density	Abs.Power Density						
Hz	mW/cm <sup>2</sup>	mW/cm <sup>9</sup>						
50	2.312	1.633	61.94	52.89	43.23	50.72	21.67	29.42
			±8.96	±3.34	±2.98	±6.58	±10.30	±10.62
100	2.312	1.633	56.55	67.94	43.17	18.53	42.06	44.44
			±9.38	±8.42	±6.78	±2.49	±12.21	±23.44
200	2.312	1.633	52.77	67.03	65.57	18.53	50.92	51.21
			±10.77	±9.51	±6.00	±2.49	±15.29	±11.41
500	2.312	1.633	42.83	50.49	72.01	14.55	38.10	58.67
			±10.67	±12.25	±4.95	±2.55	±15.41	±12.41
700	2.312	1.633	59.25	40.11	58.70	23.02	40.37	57.69
			±10.90	±2.79	±10.25	±8.91	±11.22	±6.49
1000	2.312	1.633	73.11	45.97	60.04	30.17	12.59	64.89
			±0.58	±10.63	±6.51	±9.21	±4.00	±3.77

 TABLE 1: Frequency - Mean Percent Germination of different Fungal Spores.

TABLE 2: Correlation between Frequencies and Germination of the fungal spores

NAME OF FUNGAL SPORE	<b>CORRELATION CO-EFFICIENT</b>
Alternaria tenuissima	0.32867
Altarnaria alternata	-0.61314
Fusarium udum	0.44779
Ustilago cynodontis	-0.16439
Helminthosporium tercium	-0.34430
Helminthosporium oryzae	0.63667



Figure 1: R – S Latch and Capacitor Structures.

The effect of irradiated water on spore germination of different fungi was seen. About 200 spores were picked up with a sterilized needle and mixed in a drop of treated water on glass slides. Controls consisted of a similar number of spores of each fungus in sterilized distilled water. All slides were incubated in moist chambers for 24 hours at 25  $\pm$  2 °C. Each slide was observed under the microscope and germination percentage was recorded. All the experiments were conducted in triplicate.

## **RESULTS AND DISCUSSION**

Table 1 shows germination responses of different fungal spores to modulation frequency memory of microwaves in water. The result reveals variable inhibitory effects of different pulse repetition frequencies of modulating signal on spore germination of each fungal species. Bar Chart statistics of mean percent germination versus control/frequency of the data (figure 3) shows different inhibitory effects of different pulse repetition frequencies, highly significant at

0.001 level, on spore germination of each fungal species. The pulse repetition frequency dependent variance in spore germination caused by irradiated water thus proves the existence of frequency memory in the water.





Figure 3: Frequency versus Mean percent germination of different fungal spores.

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Correlation of germination response to pulse reputation frequencies of modulating signal (Table 2) indicates that spore germination A. tenuissima is non-significant but positively; that of A. alternata is significant but negatively; that of F.Udum is significant but negatively; that of Ustilago Synodontis is non - significant but negatively; that of H. turcicum is non - significant but negatively and that of H. oryzae is significant but positively correlated at 0.05 level with pulse repetition frequencies. These pulse frequencies and species dependent effect agree well with the previous studies dealing with different bio-effects of modulation frequencies and or modulated radio frequency wave [4], [5].

In the light of variable roles of different water structures in life processes [6], [7], it can be concluded that frequency - varying water structures cause the inhibitory effects either by changing the rate and effect direction and/or inactivating the spore enzymes, responsible for fungal spore germination.

#### CONCLUSION

This study concludes that water has capability to remember the EM – field frequency. Frequency - varying different water structures inhibited the spore germination either by changing the rate and effect direction and/or inactivating the spore enzymes, responsible for spore germination. Hence, water irradiated with electromagnetic fields of varying – frequencies affect the rate of fungal spore germination.

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