

## **EFFECT OF MICROWAVE TREATED WATER ON GERMINATION OF VIGNA UNGUICULATA (COW PEA) SEEDS**

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### **Abstract**

*Microwaves spans a range from 300 MHz to 300 GHz. They are as long as one meter to as short as one millimeter. Microwaves may have both positive and negative effects on crops. This paper investigates the effect of microwaves treated water on the growth rate and germination of chavli seeds. The investigation were carried out with water exposed to microwave radiations for different time durations and at a constant power level of 100 w. The growth of the plants was studied for 10 days. During investigations, the other control variables such as temperature, humidity, sun light and level of gases (CO<sub>2</sub>, N<sub>2</sub>, and O<sub>2</sub>) were maintained constant. Overall finding suggest that microwaved water exposed for a specific time duration showed better growth rate as compared to normal water for the development of chavli seeds.*

**Keywords:** *Water, Soil, Microwave (MW) and chavli (cow pea) seeds*



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### **INTRODUCTION:**

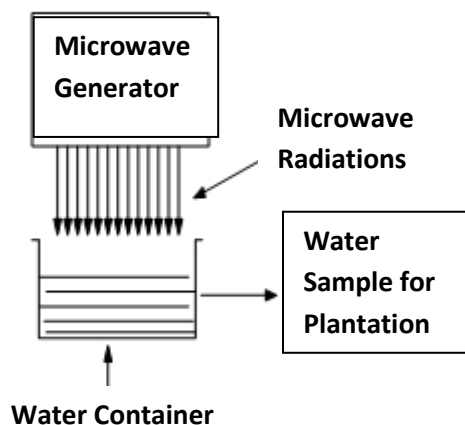
Microwaves are electromagnetic waves with wavelengths longer than those of tetrahertz waves, but shorter than radio waves. They have frequencies between 300 MHz and 300 GHz. Microwaves are not a form of heat, but a form of energy which manifests as heat through its interaction with molecules. The treatment of water by microwaves may introduce changes in pH and mobility of water molecules [5]. Chavli and its germination rate has been observed under various natural conditions. One of the next aims in the study is to understand its behavior under a very important factor present within environment i.e. microwaves which is increasing its presence in daily routine life of humans. This seeds was chosen because the plant can be conveniently grown and handled in the laboratory, and it is an important vegetable too. Guyadin investigated the effect of microwave treated water, seeds, or soil on growth of the plant. He used wheatgrass seeds in each container because they grow fast and provide results in a few weeks. He microwaved the water, seeds, and soil for different amounts of time starting at 15 seconds

and doubling the time until four minutes. This gave us proper results because with more than one time, you can see the difference and compare the results to the control. He controlled everything except the time of microwaving the seeds, soil, and water, so the results did not change because of other factors. For the water condition, all the plants grew and microwaving made the plant grow faster and increased the length. For the seed condition, microwaving the seeds caused the plants to decrease in sprouting percentage, and as the microwave duration was increased, the length of the plant was decreased. For the soil condition, the length, the sprouting, and the day of first emergence showed random behavior [1]. Aladjadjiyan investigated the influence of microwave irradiation treatment on the development of lentil seeds (*Lens Culinaris*, Med.). A magnetron OM75P (31) emitting radiation with frequency 2.45 GHz has been used as a source of microwaves for the experiment. The exposure time varied as 0 s, 30 s, 60 s, 90 s, and 120 s. The germination energy and germination of seeds in %, as well as the length of stems and roots in mm at 7th and 14th day after sowing, and the total weight at 14th day have been measured aiming to estimate the influence of microwave treatment[2]. Use of water with different molecular mobilities could affect drug dissolution of a dosage form and such profile of water might be modifiable using microwaves. This study investigated the effects of microwaved water and its influences on dissolution of free drugs and drugs in calcium-cross linked alginate beads using sulphanilamide sulphamerazine as hydrophilic and hydrophobic model drugs respectively. The water was treated by microwave at 300 w or without pre-treatment. The drug dissolution, pH, and molecule mobility profiles of untreated and microwaves treated water were investigated. Microwaves treated water had higher pH and molecular mobility. The untreated water of the same pH as microwaves treated water did not enhance the drug dissolution. Microwave treatment of water increased water molecule mobility and can promote drug dissolution. It has been reported that microwaved water helped in the growth of the plants[5]. The objective of this paper is to investigate the effect of microwaves treated water on the growth of chavli seeds.

## **II.METHODOLOGY:**

To investigate the growth of chavli seeds in response to microwaves treated water ,a household type microwave oven was used. The experiment was designed to investigate the effect of microwaves treated water on the growth of chavli seeds. To carry this experiment normal water sample was exposed to microwave radiations for different exposure duration of 30 s, 60 s, 90 s,

120 s, 150 s, 180s and at a constant power level of 100w. The same type of soil was put in 7 pots. Then in each pot ten samples of seeds were sown. After proper watering, observations were recorded for ten days consecutively with respect to change in length of shoots and roots. During investigations, the other control variables such as temperature, humidity, sun light and level of gases (CO<sub>2</sub>, N<sub>2</sub>, and O<sub>2</sub>) were maintained constant. The length of the grown plants was measured using a scale from the base of the plant to the tip. The experimental setup is shown in fig.1



**Fig.1 Experimental setup**



**Fig.2 Chawli seeds**

### **III.RESULT & DISCUSSION:**

The germination rate , change in root length and shoot length of plants are shown in graphs. The analysis of the results show that the growth of plants is dependent on exposure duration. High exposure duration maybe harmful to the growth of plants. These values were taken as mean values of the length of ten plants grown in each pot. Around 150s exposure duration at 100w power was observed as the best value for the growth of seeds.



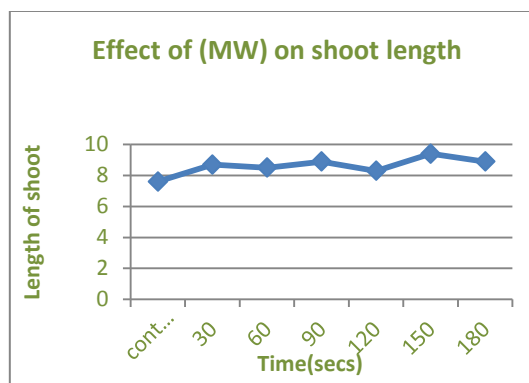
**Fig.3 Initial stage**



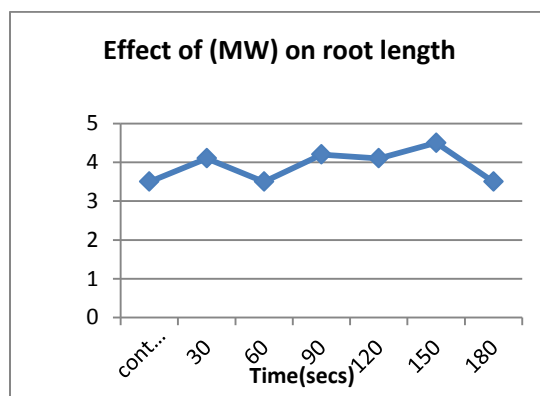
**Fig.4 Final stage**

**Effect of microwave treated water on the growth of plant with respect to:**

- **Shoot length**
- **Root length**



**Fig.5: Variation with respect to change in shoot length**



**Fig.6: Variation with respect to change in root length**

#### **IV. CONCLUSION:**

Investigations were carried out to study the effect of microwaves treated water on the growth of chavli seeds. The water was exposed to microwaves at different exposure durations and constant power level. The analysis of the result showed that exposure time around 150s helps in growth of the plants. The results may be useful for enhancing the crop production of these plants.

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