



Effect of Ultrasonic Waves on Seed Germination of *Lycopersicon Esculentum* and *Anethum Graveolens*

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Abstract

*From many years ultrasound has found of uses in engineering, science and medicine etc, therefore it has great importance. Recently the research work is still in progress to study the effects of ultrasonic waves in chemical, physical, biological, mechanical and industrial fields. Hence this paper is investigated the study of the plant growth regulators on vegetable plants (*Lycopersicon esculentum* and *Anethum graveolens*) through seed germination. These vegetable plants have high nutritional and medicinal value. The growth parameters like germination, survival, seedling height and root/shoot ratio etc were studied. The results found were used to assay the effect of ultrasonic waves on vegetable plants.*

Key words: Ultrasonic waves, Seed germination, Seedlings, Root shoot length, Vegetable plants.

Introduction:

Recently, with the continuous application of fertilizers on plants to increase the yield of crop plants, indirectly, fulfill the demand of food from the increased populations. Actually, a plant's normal growth and function depend on relatively high intracellular water content. Crop plants and human being have unique relationship since time immemorial and they are play a vital role in the human life. Therefore, need to improve the yield of crop plants. The important contributions of the nineteenth century, Experimental plant physiology to agriculture was discovery that soil fertility and crop yields could be increased by adding several nutrients to the soil. Germination is an economical and simple method for improving the nutritive value and several studies have reported [1-3] and it is used for higher yield and effective growth of plant and agricultural product. Some bivalent metal ions have been reported to be useful in agriculture as plant growth regulators. Now days, ultrasonic waves are also uses to increase the crop production because the intensity of ultra waves are not intense therefore it cannot be damage to the cell of plants as well as human being also. So necessitate concentrating on the application of ultrasonic waves for studying the germination pattern in tomato and chili because these plants have great edible and medicinal values in everyday life of human. Since, many years use of fertilizers in the agriculture field to increase the yield of crop plants were reported [4, 5]. But the fertilizers were used in the field are contains hazardous chemicals which is harmful to the environment as well as human directly or indirectly.



Therefore, the aim of this work was to study the effects of germination process and growth regulators of tomato and chili plants in presence of ultrasonic waves because of the ultrasonic waves are not harmful to the environment and human being also.

Materials and Methods:

The instrument ultra sonicator (Maxsell company, volume: 3.8 lit, dimension: L×W×D: 302×152×100 mm, frequency: 40 kHz, power: 100W, weight: 5Kg, size: 70×38×60) was used to pass the ultrasonic waves through the seeds, which were taken to study for germination patterns and compare with the control system (distilled water was used as a control and germination patterns were studied without presence of ultrasonic waves). The healthy seeds of *Lycopersicon esculentum* and *Anethum graveolens* of equal size were selected for germination study and thoroughly washed using doubly distilled water. 15 healthy seeds of equal size immersed in distilled water and 15 healthy seeds of equal size were kept in ultra sonicator and note down the reading of germination patterns after 2 days, 4 days and 10 days. The reported [4] method was used to measured the PGR parameters. Three sets of the experiments were arranged for study the parameters. The average values of these parameters are presented in Table 1 and 2.

Results and Discussion:

Plant growth regulator technique (PGR) is most important to study the pattern of germination in vegetable plants such as the parameters are percentage of germinations, survival, seedling height, shoot length, root length and leaf area of young leaves. In the present investigation, compared the study of germination effects of control system with the ultrasonic wave system on *Lycopersicon esculentum* and *Anethum graveolens* plants in terms of PGR and their general order of plant growth regulators were found as –

1. For *Lycopersicon esculentum* – Ultrasonic waves> Control
2. For *Anethum graveolens* - Ultrasonic waves> Control

Thus, the above order of plant growth regulators determined from the Table 1 and 2 and ultrasonic waves can functions as good plant growth regulators for above selected vegetable plants. In the Table 1 & 2 clearly indicates that average value of parameters like, percent germination, survival, and seedling heights, shoot length is greater than root length and it is found higher in presence of ultrasonic waves treatment than control, Hence it is clearly indicates that ultrasonic waves treatment was found more effective technique to germinate the seeds of beneficial crop plants like *Lycopersicon esculentum* and *Anethum graveolens*.



TableNo.1 Compare the effect of ultrasonic waves with control on germination patterns of *Lycopersicon esculentum*

Sr No.	Growth parameters	Seeds presence in control (without ultrasonic wave)	Seeds presence in ultrasonic wave
1.	Germination Seeds no.	15	15
2.	%Germination After 2 days	66 %	73%
3.	% Survival after 4 days	85%	90%
	After 10 days	97%	100%
4.	Seedling Height in cm	0.8 cm	1.7 cm
5.	Shoot Length in cm 4 days	2.5 cm	3.0 cm
	After 10 days	2.5 cm	3.5 cm
6.	Root Length in cm 4 days	1.5 cm	2.4 cm
	10 days	2.1 cm	3.0 cm
7.	Length of Young Leaf 4 days	0.3 cm	0.4 cm
	10 days	0.5 cm	0.7 cm

TableNo.2 Compare the effect of ultrasonic waves with control on germination patterns of *Anethum graveolens*

Sr No.	Growth parameters	Seeds presence in control (without ultrasonic wave)	Seeds presence in ultrasonic wave
1.	Germination Seeds no.	15	15
2.	%Germination After 2 days	76 %	86%
3.	% Survival after 4 days	90%	96%
	After 10 days	100%	100%
4.	Seedling Height in cm	1.0 cm	1.8 cm
5.	Shoot Length in cm 4 days	0.8 cm	1.2 cm
	After 10 days	1.5 cm	2.2 cm
6.	Root Length in cm 4 days	1.6 cm	2.3 cm
	10 days	1.9 cm	2.8 cm
7.	Length of Young Leaf 4 days	0.3 cm	0.4 cm
	10 days	0.6 cm	0.7 cm



Conclusion:

The results obtained from above Tables that showed the good effect of ultrasonic wave treatment on percentage of seed germination, root length, shoot length and seedling height etc rather than control. But high response with ultrasonic waves was given by *Anethum graveolens* crop plant rather than *Lycopersicon esculentum*. So, it can be concluded that, the ultrasonic wave treatment can functions as good plant growth regulators.

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