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Research Article

Effect of Electroculture on seed germination of certain crop plants

Rohini U. Bhagyawant[1] and Mukundraj B. Patil[2]

1Research Student
2Department of Botany, Late Ramesh Warpudkar Arts, Commerce and Science College, Sonpeth, Dist. Parbhani
Email – rohibhagyawant1@gmail.com

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Abstract

Experiments were carried out to study effect of electroculture on germination of Wheat (*Triticum aestivum)*, Carrot (*Daucus carota)* and Groundnut (*Arachis hypogea)* seeds. Twelve pots were taken for each seed type and grouped into four sets each containing three pots. Twenty seeds of Wheat and Groundnut and 25 seeds of Carrot were used for sowing in each pot. While keeping all the parameters constant 3V, 6V and 9V electricity was supplied for 10 min daily to the experimental Pots while three (control) was not supplied with electricity. Number of seedling emerged out of soil were counted and percentage of germination was calculated. In wheat highest percentage of germination was recorded in pots receiving 3V and 6volt electricity (100%). In Groundnut highest percentage of germination (90%) was recorded in pots supplied with 6V electricity followed by pots receiving 3V electricity which shows 80% seed germination. In Carrot highest percentage of germination (77%)was recorded in pots receiving 3volt electricity followed by (76%) in pots receiving 6volt electricity. From this experiment it was concluded that seeds germinated under electric stimulus (3V and 6V) shows highest seed germination in all three crops but it was decreased with increased intensity (9V).

INTRODUCTION

Use of electricity (Electric field) to enhance seed germination and plant growth is known as Electro-culture. Electric and magnetic field affect on various biological activities of plant stimulating proteins and enzymes (Morris, 1980 and Morar et al.1999) Experimental study of electricity on the plant growth was started late back in the 18th century but their results were contradictory but Now a day's electric and magnetic field are used as nonchemical method in agriculture. The effect of Electroculture on seed germination and on biological activities was studied by some researchers (Matheu and Stevenson, 1990; Ahmed,2003; Patil, 2018). Present investigations were carried out to study the effect of 3V, 6V and 9V electricity on the germination of (Wheat)*Triticum aestivum*, (Carrot) *Daucus carota* and (Groundnut) *Arachis hypogea* seeds.

MATERIALS AND METHODS

To study the effect of Electroculture on seed germination experiments were carried out in the department of Botany during October-November 2017. Three types of seeds i.e. Wheat (*Triticum aestivum)*, Carrot (*Daucus carota)* and Groundnut (*Arachis hypogea)* were used for this study. Twelve pots were taken and grouped into four sets each containing three pots. The DC (Direct Current) source was used for experiment three sets were supplied with different voltage 3V, 6V and 9V. One set of each crop was used as control. The same amount of soil was filled in all the pots. Twenty seeds of Wheat, Groundnut and 25 seeds of Carrot were planted in each pots at equal distant from each

other. All the factors (food, lights, water) were kept constant expect electricity. Electricity was applied to the experimental pots. Electricity was applied to the pots with two copper rods (electrodes) buried in the soil at the opposite side of the pots in such a way that they could not touch with each other and these electrodes were connected with DC source. Electricity was applied daily for 10minutes early in the morning. Germination was observed daily after sowing till the germination value remains same. Observations were recorded and mean value of percentage were calculated and tabulated in the tables. Data was analyzed statistically using ANOVA.

RESULT AND DISCUSSION

In wheat application of electricity resulted early germination in pots receiving with 3V, 6V as well as 9V electricity as compared to the control. Maximum germination (100%) was recorded in pots receiving 3V and 6V electricity. In pots receiving 9V electricity showed early emergence of seedlings but there was no increase in the percentage germination. ANOVA showed that there is highly significant ($p = 0.01$) increase in the percentage germination in wheat due to application of 3V and 6V electricity. There was no change in the percentage germination due to application of 9V electricity.

In carrot percentage germination was very least in Control (52%) which was enhanced to 66.67% due to application of 9V electricity which is significant at $p=0.05$ while application of 3V and 6V electricity increased percentage germination to 77.33% and 76% respectively which was significant at $p=0.01$.

In Groundnut the pots receiving 9 volt electricity showed early germination just three days after sowing but percentage germination in these pots was reduced non-significantly. Maximum seed germination (90%) was recorded in pots applied with 6V electricity this increase in seed germination is highly significant $p=0.01$. Pots applied with 3V electricity showed increase in percentage germination which was statistically non-significant.

Such type of positive effect of electricity on seed germination was recorded by s Labes, 1993; Pozeliene and Lynekine, 2009; Gandhare and Patwardhan, 2014; Rotcharoen, et al., 2002, Patil, 2018.

Thus it is clear that application of electricity mainly lower voltage of electricity (3V and 6V) to Wheat, Carrot and Groundnut seeds increased their percentage of Germination.

Table No: 1.Effect of electricity on germination of wheat

DAS	CONTROL	3Volt	6Volt	9Volt
1	0	0	0	0
2	0	0	0	0
3	0	50	83.3	0
4	0	58.3	86.7	10
5	0	66.7	93.3	15
6	8.33	70	96.7	23.3
7	35	76.7	96.7	36.7
8	43.3	78.3	96.7	46.7
9	73.3	80	96.7	65
10	78.3	80	98.3	78.3
11	78.3	81.7	98.3	78.3
12	88.3	81.7	98.3	86.7
13	88.3	86.7	100	86.7
14	88.3	86.7	100	86.7
15	88.3	90	100	86.7
16	88.3	90	100	86.7
17	91.7	100	100	91.7
Significance		**	**	NS

Table No: 3.Effect of electricity on germination of groundnut

DAI	CONTROL	3Volt	6Volt	9Volt
1	0	0	0	0
2	0	0	0	0
3	0	0	0	25
4	0	0	0	25
5	0	0	0	25
6	18.33	16.67	41.67	28.33
7	25	23.33	41.67	36.67
8	14.67	33.33	43.33	36.67
9	46.67	38.33	60	41.67
10	56.67	41.67	65	50
11	58.33	41.67	65	55
12	61.67	61.67	73.33	65
13	68.33	70	83.33	68.33
14	71.67	80	90	66.67
Significance		NS	**	NS

Statistical analysis: ANOVA

Source	Df	SS	MSS	F	
Treatments	3	1084.67	361.56	14.79	**
Days	13	39980.80	3057.45	125.79	**
Error	39	953.52	24.45		
Total	55	42019.00			

DAS - Days after Sowing
***Significant at p = 0.05; ** significant at p= 0.001; NS- Non-significant**

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