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IMPACT OF pH ON GERMINATION OF VARIOUS SEEDS

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ABSTRACT

The present study deals with impact of pH on germination of green gram, black eyed peas, mustard and ragi seeds. The seeds are tested for germination at pH values from 2.4 to 11.92. The black eyed pea seeds are germinated in the pH range 4-8 with 0.5 increments. Highest seed germination is observed at pH 8.0for black eyed peas. No germination is observed at pH 2.42 and 11.92 indicating highly acidic and basic media inhibits seed germination.

INTRODUCTION

Black eyed pea seeds, finger millets, mustard and Green gram are mainly consumed by the people in India because of their high protein content. Especially these sprouted seeds are very good for diabetic patients. Green gram seeds are also rich source of B complex vitamins whereas black eyed seeds contain fibre and vitamin-A. Finger millets contain an amino acid tryptophan which is useful to decrease appetite. Mustard seeds are rich source of selenium omega three fats, phosphorus, manganese, magnesium, vitamin-B_1 and copper. So they exhibit healing and antioxidant properties. The presence of trace metals, pH of soil and other atmospheric conditions play a vital role in the germination of seeds(1-3). In the life cycle of plant, germination stage is a vulnerable stage (4-10). So to estimate the effect of pH on germination the present study is carried out.

MATERIALS AND METHODS

Black eyed pea, Ragi, Mustard and Green gram seeds are collected from Guntur local market. All the reagents used are of analytical grade. Double distilled water is used for the preparation of solutions. Eight buffer solutions are prepared by mixing of disodium hydrogen phosphate and citric acid. The pH of 8 buffer solutions are ranged from 4 to 8 and these are placed in 8 different 50 ml standard flasks.

S.No	Volume of Na_2HPO_4(ml)	Volume of citric acid(ml)	pH
1	19.2	30.8	4.0
2	25.8	24.2	5.0
3	29.0	21.0	5.5
4	31.6	18.4	6.0
5	36.4	13.6	6.5
6	41.2	8.8	7.0
7	46.8	3.2	7.5
8	48.6	1.4	8.0

28g of disodium hydrogen phosphate is transferred in to 1 litre standard flask and it is made up to the mark using distilled water and 192g of citric acid is dissolved in distilled water and made up to 1litre.

S.No	Solution used	pH
1	5% HCl	2.42
2	5% NaOH	11.92
3	Distilled H_2O	6.64
4	H_2O	7.12

8 Petri dishes are sterilised and circular filter papers are placed in them. Buffer solution (10ml) is added to 8 Petri dishes. The seeds are placed on the surface of each filter paper in the Petri dish by taking care that no two seeds are in contact with each other. They are placed in a warm place and after 3 days, percentage of seed germination is calculated.

The percentage of seed germination for each dish= (No. of seeds germinated/ Total No. of seeds) x 100

RESULTS AND DISCUSSION

Highly acidic and alkaline conditions are not suitable for seed germination. This study confirmed that pH 6.5-8 range is suitable for germination of seeds.

Table-III

S.No	Solutions used	pH	% of germination											
			Blackeyed peas			Mustard seeds			Green Gram			Ragi		
			D_1	D_2	D_3	D1	D2	D3	D_1	D_2	D_3	D1	D2	D3
1.	5% HCl	2.42	0	0	0	0	0	0	0	0	0	0	0	0
2.	5%NaOH	11.92	0	0	0	0	0	0	0	0	0	0	0	0
3.	Dis.H_2O	6.64	40	53	100	40	73.3	93.3	26	66	100	66.6	66.6	66.7
4.	Tap H_2O	7.12	20	33	46	0	66.6	86.7	13	40	80	60	60	60

Table-IV

S. No	Volume of Na_2HPO_4(ml)	Volume of Citric acid(ml)	pH	Black Eyed peas gram (% of germination.		
				D_1	D_2	D_3
1.	19.2	30.8	4.0	0	0	0
2.	25.8	24.2	5.0	0	0	0
3.	29.0	21.0	5.5	0	0	0
4.	31.6	18.4	6.0	0	0	0
5.	36.4	13.6	6.5	10	30	30
6.	41.2	8.8	7.0	20	65	65
7.	46.8	3.2	7.5	50	100	100
8.	48.6	1.4	8.0	55	100	100

The pH value had a significant role on germination of seeds. Black gram seeds did not germinate at pH levels 2.42,4.0,5.0,5.5,6.0 and 11.92 where as Bengal gram seeds show very little percentage of seed germination. Mustard and ragi seeds show germination in the pH range 6-7. The pH values from 6.6 to 8.0 stimulated the seed germination. Pretreatment effect on seed germination also studied at pH range 2.42-11.92. Pre soaked seeds in distilled water and tap water show maximum percentage of seed germination.

CONCLUSION

Black gram, green gram, mustard and ragi seeds are tested at different pH values for seed germination. It is observed that maximum percentage of seed germination at p H values 6.6 to 8.0. Pre soaked seeds in solutions at p H levels 2.42 and 11.92 did not show any seed germination. The present study reports that p H range 6.6 to 8.0 is suitable for stimulation of germination of black gram, mustard, ragi and green gram seeds.

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