

**EFFECT OF PLANT GROWTH REGULATORS AND STAGES OF SPRAY
ON SEED QUALITY OF RIDGE GOURD (*Luffa acutangula* L. ROXB)**

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ABSTRACT

Effect of plant growth regulators and stages of spray on seed quality of ridge gourd was studied in the laboratory of Department of Seed Science and Technology, College of Agriculture, Junagadh Agricultural University, Junagadh during summer 2013. The seed of Gujarat Anand Turiya 1 variety of ridge gourd were obtained from the Vegetable Research Station, Junagadh Agricultural University, Junagadh. The field experiment consisted of 30 treatment combinations involving ten treatments (eight plant growth regulators, water spray and control) sprayed at three different stages of crop. The seed harvested from 30 different treatments combinations replicated thrice from the field were analyzed in the laboratory following completely randomized design for various qualitative traits viz., germination percentage, root length, shoot length, root fresh weight, shoot fresh weight, root dry weight, shoot dry weight, vigour index I and vigour index II. The qualitative characters were measured following the standard procedure. The results revealed that among the plant growth regulators, 250 ppm ethrel recorded highest germination percentage. NAA 50 ppm recorded higher root length, shoot length, root fresh weight, shoot fresh weight, root dry weight, shoot dry weight and vigour index I and vigour index II. Highest germination was recorded with 250 ppm ethrel sprayed at two to four leaf stages. Spraying at two to four leaf stages recorded highest root length, vigour I index I and vigour index II. Spraying at flower initiation stages recorded highest shoot length, root fresh weight and root dry weight and spraying at fifteen days after flower initiation stage recorded higher shoot fresh weight and shoot dry weight.

KEY WORDS: Growth regulators, seed quality, ridge gourd

INTRODUCTION

Seed is the basic and cheapest input among other inputs viz., manures, fertilizer, pesticides fungicides etc. Use of high quality seed imparts higher yield and better quality produce. The production of genetically pure seed material and to preserve its quality from harvest to next planting

season is very much essential. In a seed crop, use of growth regulators and stages of spray plays a very important role for development of plant and seed. They are known to modify the sex expression, the source-sink relationship and increase the translocation of synthates effectively resulting in increased seed yield and

quality. Ridge gourd belonging to a family *Cucurbitacea*, is gaining commercial importance as green vegetable crop. There is a great potential to increase the seed yield with good quality parameters either by reducing flower drop or by increasing fruit set. To achieve this plant growth regulators are considered as a new generation agro chemicals after fertilizers, pesticides and herbicides. Plant growth regulators have potential ability to increase the productivity of seed crop. But the information available on the interaction of growth regulators and stages of spray in ridge gourd is very limited. In this background, an investigation was initiated to know the influence of growth regulators and stages of spray on seed quality of ridge gourd.

MATERIALS AND METHODS

Effect of plant growth regulators and stages of spray on seed quality of ridge gourd was studied in the laboratory of Department of Seed Science and Technology, College of Agriculture, Junagadh Agricultural University, Junagadh during summer 2013. The seed of Gujarat Anand Turiya 1 variety of ridge gourd were obtained from the Vegetable Research Station, Junagadh Agricultural University, Junagadh. The field experiment consisted of 30 treatment combinations involving ten treatments (eight plant growth regulators, water spray and control) sprayed at three different stages of crop. The seed harvested from 30 different treatments combinations replicated thrice from the field were analyzed in the laboratory following completely randomized design for various qualitative traits viz., germination percentage, root length, shoot length, root fresh weight, shoot fresh weight, root dry weight, shoot dry weight, vigour index I and vigour index II. The qualitative

characters were measured following the standard procedure.

RESULTS AND DISCUSSION

Effect of plant growth regulators and plant growth stages on seed quality of ridge gourd is presented in Table 1. Significantly the highest seed germination was recorded in S₃ treatment (69.22%) and it was at par with S₆ (69.00%). The significantly minimum seed germination was observed in S₈ treatment (47.56%). The results are similar to the findings reported by Hilli (2005), Hilli *et al.* (2008) and Hilli *et al.* (2010) in ridge gourd, and Gedam *et al.* (1996) and Shantappa *et al.* (2007) in bitter gourd.

The application of NAA at 50 ppm (S₅ treatment) recorded significantly the highest root length (18.37 cm), shoot length (24.94 cm), root fresh weight (0.25 gm), shoot fresh weight (1.28 gm), root dry weight (15.24 mg), shoot dry weight (61.73 mg), vigour index I (2737.85) and vigour index II (5029.33). The present findings are in conformity with those of Hilli (2005) and Hilli *et al.* (2008) in ridge gourd and Shantappa *et al.* (2007) in bitter gourd.

The significantly highest root length was recorded in S₅ treatment (18.37 cm) and it was at par with S₇ (17.69 cm). The minimum root length was observed in S₃ treatment (15.93 cm). S₅ treatment (24.94 cm) ranked first by recording significantly maximum shoot length and it was at par with S₂ (24.24 cm). The significantly minimum shoot length (21.69 cm) was observed in S₃ treatment. The significantly highest root fresh weight was recorded with S₅ treatment (0.25 gm). The minimum root fresh weight (0.15 gm) was observed in S₈, S₉ and S₁₀ treatments. The significantly highest shoot fresh weight was recorded with S₅ treatment (1.28 gm) and it was at par with S₂

treatment (1.24 gm). The minimum shoot fresh weight was observed in S₆ treatment (1.08 gm). The significantly highest root dry weight was recorded with S₅ treatment (15.24 mg). The minimum root dry weight was observed in S₈ treatment (12.02 mg). The significantly highest shoot dry weight was recorded with S₅ treatment (61.73 mg) and it was at par with S₈ (61.51 mg), S₆ (60.36 mg) and S₃ (59.78 mg). The minimum shoot dry weight was observed in S₁ treatment (54.29 mg). The significantly highest vigour index I was recorded with S₅ treatment (2737.85) and it was at par with S₇ (2653.49). The minimum vigour index I was observed in S₈ treatment (1901.98). The significantly highest vigour index II was recorded with S₅ treatment (5029.33) and it was at par with S₇ (5012.44) and S₃ (4979.33). The significantly lowest vigour index II was observed in S₈ treatment (3442.67).

The results presented in Table 1 also revealed that all the quality parameters except germination and shoot dry weight affected significantly by the spraying of plant growth regulators at different stages of spray. Spraying of growth regulators at two to four leaf stage recorded highest germination (60.90%), root length (17.17 cm), vigour index I (2460.80) and vigour index II (4377.66). Spraying at flower initiation stages recorded highest shoot length (23.71 cm), root fresh weight (0.19 gm) and root dry weight (13.79 mg) and spraying at fifteen days after flower initiation stage recorded higher shoot fresh weight (1.20 gm) and shoot dry weight (58.55 mg). The present findings are in conformity with Hilli (2005) and Hilli *et al.* (2008). The interaction effect of different plant growth regulators x stages of spray was significant for all the quality traits.

CONCLUSION

From the results, it can be concluded that spraying of 250 ppm ethrel recorded highest germination percentage, whereas NAA 50 ppm recorded higher root length, shoot length, root fresh weight, shoot fresh weight, root dry weight, shoot dry weight and vigour index I and vigour index II. Therefore, concentration of 250 ppm ethrel and 50 ppm NAA were found effective in increasing the seed quality. Spraying of plant growth regulators at two to four leaf stages were found effective, as they produced highest root length, vigour I index I and vigour index II.

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Table 1: Effect of plant growth regulators and plant growth stages on seed quality of ridge gourd (*Luffa acutangula* L. Roxb).

Treatment	Germination Percentage				Root Length (cm)				Shoot Length (cm)			
	M ₁	M ₂	M ₃	Mean	M ₁	M ₂	M ₃	Mean	M ₁	M ₂	M ₃	Mean
S ₁ = 25 ppm GA ₃	66.67	54.67	65.33	62.22	15.10	16.57	16.56	16.08	20.00	22.20	27.03	23.08
S ₂ = 50 ppm GA ₃	46.00	74.00	65.33	61.78	17.57	14.20	19.43	17.07	22.23	26.37	24.13	24.24
S ₃ = 250 ppm Ethrel	52.00	69.00	86.67	69.22	15.20	18.40	14.20	15.93	23.33	21.77	19.97	21.69
S ₄ = 500 ppm Ethrel	48.00	62.00	56.33	55.44	20.00	16.23	13.83	16.69	23.23	23.00	22.13	22.79
S ₅ = 50 ppm NAA	67.33	69.33	61.33	66.00	17.85	15.87	21.40	18.37	24.05	25.53	25.23	24.94
S ₆ = 100 ppm NAA	77.67	66.00	53.33	69.00	18.40	17.23	15.60	17.08	23.13	24.20	20.30	22.54
S ₇ = 100ppm Cycocel	77.33	56.67	64.33	66.11	20.37	17.63	15.07	17.69	21.43	22.83	23.27	22.51
S ₈ = 200 ppm Cycocel	47.33	49.33	46.00	47.56	15.20	17.27	17.70	16.72	22.77	24.30	22.93	23.33
S ₉ = Water Spray	70.00	50.00	42.00	54.00	16.50	18.23	16.03	16.92	24.70	24.40	22.23	23.78
S ₁₀ = Control (No Spray)	56.67	51.33	53.33	53.78	15.50	15.50	17.27	16.09	20.63	22.50	24.63	22.59
Mean	60.90	60.23	60.40	60.51	17.17	16.71	16.71	16.86	22.55	23.71	23.19	23.15
	M	S	M × S		M	S	M × S		M	S	M × S	
S.Em.	0.41	0.75	1.31		0.13	0.24	0.42		0.19	0.34	0.60	
C.D.	NS	2.14	3.71		0.37	0.69	1.19		0.53	0.98	1.70	
C.V.%	4.48	3.75	3.75		5.23	4.34	4.34		5.13	4.49	4.49	

Table 1: Contd...

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Treatment	Root Fresh Weight (gm)				Shoot Fresh Weight (gm)				Root Dry Weight (mg)			
	M ₁	M ₂	M ₃	Mean	M ₁	M ₂	M ₃	Mean	M ₁	M ₂	M ₃	Mean
S ₁ = 25 ppm GA ₃	0.13	0.15	0.19	0.16	1.14	1.28	1.19	1.20	10.00	17.00	10.40	12.47
S ₂ = 50 ppm GA ₃	0.17	0.13	0.18	0.16	1.14	1.26	1.33	1.24	15.67	10.20	12.00	12.62
S ₃ = 250 ppm Ethrel	0.17	0.20	0.16	0.17	1.31	1.23	1.12	1.22	12.06	14.67	13.47	13.40
S ₄ = 500 ppm Ethrel	0.20	0.17	0.13	0.17	1.21	1.17	1.09	1.16	13.67	16.13	12.40	14.07
S ₅ = 50 ppm NAA	0.17	0.42	0.15	0.25	1.24	1.38	1.23	1.28	13.93	18.00	13.80	15.24
S ₆ = 100 ppm NAA	0.15	0.15	0.20	0.17	1.11	1.04	1.08	1.08	12.00	11.20	18.27	13.82
S ₇ = 100ppm Cycocel	0.15	0.18	0.16	0.16	1.09	1.17	1.25	1.17	11.87	13.40	14.87	13.38
S ₈ = 200 ppm Cycocel	0.13	0.16	0.15	0.15	1.16	1.00	1.39	1.18	13.00	11.80	11.27	12.02
S ₉ = Water Spray	0.16	0.13	0.17	0.15	1.14	1.35	1.08	1.19	17.73	10.67	12.20	13.53
S ₁₀ = Control (No Spray)	0.12	0.15	0.17	0.15	0.90	1.16	1.29	1.12	15.27	14.80	11.13	13.73
Mean	0.16	0.19	0.17	0.17	1.13	1.20	1.20	1.17	13.52	13.79	12.98	13.43
	M	S	M × S		M	S	M × S		M	S	M × S	
S.Em.	0.002	0.003	0.005		0.01	0.01	0.03		0.11	0.21	0.38	
C.D.	0.004	0.008	0.014		0.02	0.05	0.08		0.33	0.61	1.07	
C.V.%	3.32	5.00	5.00		4.49	4.42	4.42		4.09	4.86	4.86	

Table 1: Contd...

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Treatment	Shoot Dry Weight (mg)				Vigour Index I				Vigour Index II			
	M ₁	M ₂	M ₃	Mean	M ₁	M ₂	M ₃	Mean	M ₁	M ₂	M ₃	Mean
S ₁ = 25 ppm GA ₃	51.73	59.07	52.07	54.29	2650.77	2306.93	2567.33	2508.35	4117.47	4166.07	3605.27	3962.93
S ₂ = 50 ppm GA ₃	59.47	56.26	52.00	55.91	2024.40	2973.47	2865.13	2621.00	3506.67	4548.53	4225.20	4093.47
S ₃ = 250 ppm Ethrel	52.27	71.07	56.00	59.78	2004.07	2842.67	2958.47	2601.73	5412.53	4841.20	4684.27	4979.33
S ₄ = 500 ppm Ethrel	52.20	61.93	52.13	55.42	2085.93	2434.60	2040.43	2186.99	3183.20	4797.73	3446.73	3809.22
S ₅ = 50 ppm NAA	66.80	55.93	62.47	61.73	2600.35	2679.87	2933.33	2737.85	3326.00	5744.07	6017.93	5029.33
S ₆ = 100 ppm NAA	58.00	48.93	74.13	60.36	3218.00	2252.35	2378.40	2616.25	5480.47	3221.73	5759.07	4820.42
S ₇ = 100ppm Cycocel	63.73	52.47	58.20	58.13	3270.67	2388.33	2301.47	2653.49	6013.07	4746.80	4277.47	5012.44
S ₈ = 200 ppm Cycocel	64.40	56.93	63.20	61.51	1812.27	2028.67	1865.00	1901.98	3649.07	3246.40	3432.53	3442.67
S ₉ = Water Spray	53.97	54.47	58.27	55.57	2877.40	2078.07	1596.47	2183.98	5048.93	3320.20	3020.53	3796.56
S ₁₀ = Control (No Spray)	56.07	56.66	57.00	56.58	2064.13	1987.93	2290.67	2114.24	4039.20	3826.00	3790.13	3885.11
Mean	57.86	57.37	58.55	57.92	2460.80	2397.29	2379.67	2412.59	4377.66	4245.87	4225.91	4283.15
	M	S	M × S		M	S	M × S		M	S	M × S	
S.Em.	0.41	0.75	1.30		21.08	38.49	66.65		37.90	69.19	119.84	
C.D.	NA	2.13	3.69		59.77	109.13	18.03		107.48	196.23	339.88	
C.V. %	4.08	3.89	3.89		3.82	4.79	4.79		5.22	4.85	4.85	

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