

EFFECT OF DIFFERENT SEED TREATMENTS ON GROWTH OF ROYAL PALM

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ABSTRACT

The present investigation was conducted to find out effect of different seed treatments on growth of royal palm at farm of Horticulture Section, College of Agriculture, Nagpur, in 2019-2020. Completely Randomized Design was used consisting of twelve treatments and three replications. Treatments were control, hot water, brine solution 2%, cow dung slurry, H₂SO₄ for 10, 20 and 30 min, GA₃ - 500, 1000 and 1500 ppm, KNO₃ 0.2 and 0.3 %. The results revealed that maximum length of leaf (cm), leaf area (cm²), fresh weight (g), dry weight (g), plant height (cm), stem girth (cm) were recorded with GA₃ 1500 ppm.

(Key words: GA₃, H₂SO₄, KNO₃, plant growth, royal palm)

INTRODUCTION

In the last century, landscape was considered as an important tool in enhancing life quality of individuals in parallel with the recent developments in urbanization in the world, particularly in developed countries. Today, green quantity capita¹ is used as a standard of life quality. Arrangement of outdoor areas became an important economic sector. *Roystonea* genus consists of 11 species of palm tree that commonly called royal palm, palma real, yagua. Ornamental plants can only propagate from seed. There is slow and uneven seed germination. Seeds appear to have immature embryos at the time that fruit fall and thus will not germinate early.

Roystonea regia commonly known as the Cuban royal palm or the Florida royal palm species of palm that is native to Mexico, parts of Central America and the Caribbean, and southern Florida. A large and attractive palm, it has been planted throughout the tropics and subtropics as an ornamental tree. Although it is sometimes called *R. elata*, the conserved name *R. regia* is now the correct name for the species. It is ideal for landscaping street, typical residential landscapes. Royal Palm is national tree of Cuba, and has a religious role in Christianity. The Royal Palm reaches heights from 50 to 70 feet tall and stem diameter of about 47 cm. Royal palm are woody. Royal Palm is placed in the subfamily Arecoideae and the tribe Roystonea. Palms are propagated by seed. All palms have hypogeal germination since the seed is not raised above soil (Tillich, 2007). Seed dormancy is a common occurrence in palms from various origins (Baskin and Baskin, 2001). The palm grower can maximize success with germinating palm seed by paying careful attention to the number of basic guidelines and adopting different mechanical and chemical method. The

seed coat of royal palm are hard and the chemical like GA₃, H₂SO₄, KNO₃ are useful for breaking seed coat and mechanical treatment like scarification, hot water, cow dung play important role. Thus, it is assumed that due the slow and uneven germination of seeds chemical and mechanical treatment provides better germination of royal palm.

MATERIALS AND METHODS

The investigation was carried out at farm of Horticulture Section, College of Agriculture, Nagpur during 2019-2020. The investigation was laid out in Completely Randomised Design consisting of twelve treatments and three replications. Nagpur is situated at 20° 10' North latitude and 79° 19' East longitudes at the elevation of 321.26 meter above mean sea level (MSL.) Nagpur is characterized by hot, dry summer and fairly cold winter. The present experiment was laid out in Completely Randomized Design with 12 treatments replicated thrice. The seeds were obtained from Maharaj Bag and Telenkhedi garden, Horticulture section College of Agriculture, Nagpur during the month of April- May, 2019. The seeds were cleaned by rubbing all extraneous materials and then dipped in water. All the floating seeds were discarded and only the healthy seeds which were settled down were taken for use in these studies (Yocum, 1961). Black colour poly bag (4x8 inches size) were filled with soil, FYM and cocopeat in the ratio 1:2:1. Irrigation was provided to seeds sown in poly bags using water can and maintained the proper moisture level. The poly bags were watered every day and then required till germination takes place with the help of watering can. Timely and suitable plant protection measures were applied to protect the plants from pest and disease incidence. The plants were protected from rotting by drenching of Bavistin @ 2 g 5 lit⁻¹ water. The treatments were T₁ control, T₂ Hot water treatment, T₃ Brine

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Table1. Effect of different seed treatments on plant growth in royal palm

Treatments	Leaf area	Stem	Fresh	Dry	Length of leaf		Plant height	
	(cm ²)	girth (cm)	weight	weight	(cm)		(cm)	
			of plant (g)	of				
	120 DAS	150 DAS	150 DAS	150 DAS	120 DAS	150 DAS	120 DAS	150 DAS
T ₁ -control (water soaking)	4.67	0.49	6.73	1.39	5.98	10.95	10.14	16.77
T ₁ -control (water soaking) 16.77		4.67	0.49	6.73	1.39	5.98	10.95	10.14
T ₂ -Hot water	5.13	0.66	8.31	1.67	8.69	15.76	12.38	17.94
T ₃ - Brine solution 2%	7.09	0.73	8.86	2.06	9.84	18.84	14.12	19.65
T ₄ -Cow dung slurry	11.57	0.75	9.20	2.70	10.60	20.04	15.08	23.11
T ₅ -H ₂ SO ₄ - 10 min	15.75	1.00	10.87	3.62	13.50	22.54	18.73	29.09
T ₆ -H ₂ SO ₄ -20 min	16.69	1.14	11.31	4.66	14.83	23.67	20.09	30.07
T ₇ -H ₂ SO ₄ - 30min	18.54	1.27	12.11	5.37	15.47	24.42	21.44	31.02
T ₈ -GA ₃ -500 ppm	19.84	1.74	12.87	5.87	16.92	25.87	23.00	32.09
T ₉ -GA ₃ -1000 ppm	20.85	1.82	13.70	6.77	18.98	27.04	24.38	34.23
T ₁₀ -GA ₃ -1500 ppm	22.86	2.09	15.02	7.72	20.98	30.41	27.41	38.16
T ₁₁ - KNO ₃ -0.2%	14.37	0.82	10.25	3.30	11.41	20.49	17.69	27.33
T ₁₂ - KON ₃ - 0.3%	15.44	0.92	10.40	3.49	12.64	21.57	18.40	28.43
SE(m)±	0.59	0.04	0.33	0.16	0.53	0.62	0.50	0.67
CD at 5%	1.72	0.13	0.96	0.46	1.57	1.81	1.46	1.98

solution 2%, T₄ Cow dung slurry, T₅ H₂SO₄ 10 min, T₆ H₂SO₄ 20min, T₇ H₂SO₄ 30 min, T₈ GA₃- 500 ppm, T₉ GA₃-1000 ppm, T₁₀-1500 ppm, T₁₁ KNO₃ 0.2% and T₁₂ KNO₃ - 0.3%. The observations on leaf area (cm²) at 120 DAS, stem girth (cm) at 150 DAS, fresh weight (g) at 150 DAS, dry weight (g) at 150 DAS, length of leaf (cm) at 120 and 150 DAS and plant height (cm) at 120 and 150 DAS were recorded and analyzed statistically as per the method suggested by Panse and Sukhatme(1967).

RESULTS AND DISCUSSION

The results revealed that at 120 days after sowing maximum length of leaf (20.98 cm) was recorded with treatment T₁₀ i.e. GA₃-1500 ppm which was found significantly superior with all the treatments. Whereas, treatment T₉ i.e. GA₃ - 1000 ppm (18.98 cm), T₈ GA₃ - 500 ppm (16.92), T₇ H₂SO₄-30 min (15.47 cm), T₆ H₂SO₄- 20 min (14.83 cm) noted moderate length of leaf and T₁ i.e. water soaking treatment recorded minimum length of leaf (5.98 cm). At 150 DAS maximum length of leaf (30.41 cm) was noted with the treatment T₁₀ i.e. GA₃-1500 ppm which was found significantly superior with all the treatments. Whereas, T₁ i.e. water soaking treatment found minimum length of leaf (10.95 cm) and treatments T₉ GA₃-1000 ppm (27.04 cm), T₈ GA₃-500 ppm (25.87 cm), T₇ H₂SO₄-30 min (24.42 cm), T₆ H₂SO₄- 20 min (23.67 cm) recorded moderate length of leaf at 150 days after sowing.

The treatment of T₁₀ i.e. GA₃ -1500 ppm noted significantly maximum leaf area (22.86 cm²) as compared to all other treatments. Whereas, treatments T₉ GA₃ -1000 ppm (20.85 cm²), T₈ GA₃ -500 ppm (19.84 cm²), T₇ H₂SO₄-30 min (18.54 cm²), T₆ H₂SO₄- 20 min (16.69 cm²) recorded moderate leaf area and T₁ i.e. water soaking (4.67 cm²) was observed minimum leaf area.

Significantly maximum fresh weight (15.02 g) was noticed in treatment T₁₀ i.e. GA₃-1500 ppm and was found significantly superior over rest of the treatments. Whereas, treatments T₉ GA₃ -1000 ppm (13.70 g) T₈ GA₃ -500 ppm (12.87 g) T₇ H₂SO₄-30 min (12.11 g) T₆ H₂SO₄- 20 min (11.31 g) recorded fresh moderate weight of plant and minimum fresh weight (6.73 g) was recorded with T₁ i.e. water soaking. Suradinata *et al.* (2015) in christmas palm found that maximum fresh weight (3.76 g) was noted with GA₃ @ 200 ppm soaking for 48 hours. Elfianis *et al.* (2019) observed effect of scarification and GA₃ hormone for germination and growth of Christmas palm. Maximum fresh weight (4.53 g) was recorded with dipping of GA₃ @ 450 ppm for 2 hours.

Significantly maximum dry weight (7.72 g) was noticed in treatment T₁₀ i.e. GA₃-1500 ppm and was found significantly superior over rest of the treatments. Whereas, minimum dry weight (1.39 g) was recorded with treatment T₁ i.e. water soaking and treatments T₉ GA₃ -1000 ppm (6.77 g), T₈ GA₃ -500 ppm (5.87 g), T₇ H₂SO₄-30 min (5.37 g), T₆ H₂SO₄- 20 min (4.66 g) recorded moderate dry weight of plant. Suradinata *et al.* (2015) in christmas palm recorded maximum dry weight (1.30 g) with GA₃ @200 ppm soaking for 48 hours. Elfianis *et al.* (2019) noted the effect of scarification and GA₃ hormone for germination and growth of christmas palm. Maximum dry weight (1.99 g) was observed with dipping of GA₃ @ 450 ppm for 2 hours.

At 120 days after sowing maximum plant height (27.41 cm) was observed with treatment T₁₀ i.e. GA₃-1500 ppm which was found significantly superior over rest of the treatments under study. Whereas, treatments T₉ GA₃ -1000 ppm (24.38 cm), T₈ GA₃ -500 ppm (23.00 cm), T₇ H₂SO₄-30 min (21.44 cm), T₆ H₂SO₄- 20 min (20.09 cm) recorded moderate plant height and T₁ i.e. water soaking treatment noticed minimum plant height (10.14 cm). Maximum plant height (38.16 cm) was noted with treatment T₁₀ i.e. GA₃-1500 ppm (38.16 cm) which was found significantly superior over all the treatments. Whereas, treatment T₁ i.e. water soaking treatment recorded minimum plant height (16.77 cm) and treatments T₉ GA₃ -1000 ppm (34.23 cm), T₈ GA₃ -500 ppm (32.09 cm), T₇ H₂SO₄-30 min (31.02 cm), T₆ H₂SO₄- 20 min (30.07 cm) noted moderate plant height at 150 days after sowing. This might be due the fact that an application of gibberellic acid at different concentrations might have increased the plant height by increasing the internodal length and growth stimulation due to GA₃ is attributed to both cell division and cell enlargement. Similar results were found by Aziz and Abdullah (2016) in *Areng apinnata*. Results revealed that highest plant height was found with GA₃ - 170 ppm i. e. 38.6 cm.

The treatment of T₁₀ i.e. GA₃-1500 ppm recorded significantly maximum stem girth (2.09 cm) as compared to all other treatments, which was found significantly superior over all the treatments. Whereas, treatments T₉ GA₃-1000 ppm (1.82 cm), T₈ GA₃ -500 ppm (1.74 cm), T₇ H₂SO₄-30 min (1.27 cm), T₆ H₂SO₄- 20 min (1.14 cm) recorded moderate stem girth and T₁ i.e. water soaking noted minimum stem girth (0.49 cm).

Length of leaf (cm) at 120 and 150 DAS, leaf area cm² at 120 DAS, stem girth (cm) at 120 DAS, plant height (cm) at 120 and 150 DAS, fresh and dry weight (g) at 150 DAS were recorded maximum with seed treatment of T₁₀ i.e. GA₃-1500 ppm. All the treatments were found superior over the control i.e. water soaking.

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