Standardization of Suitable Pre-treatments to Break Dormancy of Queen Palm (*Livistona rotundifolia)* Seeds

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Introduction

Queen palm (*Livistona rotundifolia*) is a popular hermaphroditic palm which has the highest demand as a pot plant. It requires a shady sheltered place in the sub-tropics and humid, tropical areas.It is a palm which only propagates from seeds and also disreputable in the nursery trade for slow and uneven seed germination mainly because of hard and impermeable seed coat.The hard seed coat prevents imbibition and gaseous exchange that leads to physical dormancy. It has been estimated that over 25% of all palm species having less than 20% total germination (Tomlinson, 1990). Due to the often slow and uneven germination of seeds, there is a great deal of interest to develop a technique to soften the hard seed coat that might result in more even rates of germination. Therefore, an experiment was carried out to standardize the best treatment to overcome the dormancy and to attain higher germination potential.

Methodology

This experiment was carried out in a shade house at the Omega Green (Pvt.) ltd, Negambo which is in the Low country Wet Zone of Sri Lanka from May to September 2013.The seed samples obtained from numerous arbitrarily selected trees in Godigamuwa area and samples of different maturity levels were tested for viability. Seeds were assessed for germination behavior and seedling characters with four pretreatments. Treatments were T_1- Presoaking treatment in cold water for 12 hours (Control), T_2- Hot water soaking treatment in 55 to 60 ^{0}C hot water for 2 minutes and subsequently soaked in water for 12 hours, T_3- Mechanical Treatment with hammer, and T_4-Chemical Treatment (seeds were treated with 10% Na_2HOCl solution for 10 to 30 minutes and soaked in water for 12 hours).Seeds were soaked for 7 days in water prior to the dormancy breaking treatments. Treated seeds were sown in seed beds containing coir dust, sand 1:1 ratio as medium. These treatments were arranged in Single Factor Complete Randomized design (CRD) with four treatments in four replicates. Seed germination behavior and seedling characters were measured after first month of sawing. Four month aftersowing, counts were made and germination expressed as percentage of seeds which produce normal seedlings. After germination count twenty random seedlings from each treatment were measured for their shoot and root length. Vigor index was calculated as prescribed by ISTA (1985).

Results and Discussion

Seed germination behavior: Even after favorable conditions for germination fully ripe seeds stored for 2 to 3 weeks after harvest showed 70±5 per cent viability percentage and 3 to 8 weeks stored seeds showed 40±5 percentage. 70±5 per cent viable seeds were used for the experiment. In 6th week after first month (WA 1 M) of sawing number of seedlings was significantly low for treatments. After 12 th W.A 1st M of sawing number of seedlings and final germination percentage were significantly affected by treatments (Table 1). Seed moisture content and seed dry weight were not significantly affected by pretreatments in first month of sawing. The treatment consists with mechanically treated seeds had high moisture content in 2 nd month of sawing. In 2 ndmonth of sawing dry matter increment was observed in seeds with the radical emergence (Table 2).

Table 1. Mean number of seedlings of *Livistona rotundifolia* for different treatments.

Treatments	2nd week	4th week	6th week	8th week	10th week	12th week
T1	27.5	53.25	96.5	180.25	269.5	335.75
T2	36.5	65.25	131	216.75	298.25	371.5
T3	22.5	43	69.5	119	197.75	274.5
T4	43.25	69.75	146	229.25	334.75	418

Table 2. Effect of treatments on germination behavior of *Livistona rotundifolia* seeds.

Treatments	1st month		2nd month	
	DW	MC (%)	DW	MC (%)
T1	1.326	46.77	1.304	41.59
T2	1.182	46.50	1.345	42.21
T3	1.141	44.93	1.343	48.10
T4	1.113	45.10	1.393	44.44

Seedling characters: Seedling height and seedling vigor were not significantly affected by pre seed treatments in this study. Data on the influence of various methods of breaking dormancy on the germination of *Livistona rotundifolia* seeds are presented in Table 3. The seeds treated with 10% Na_2HOCl solution for 10 minutes followed by 12 hours water soaking recorded higher germination percentage value and higher vigor index of (502.14), while lower value (305.73) was observed in mechanically treated seeds. Broschat and Latham (1994) reported that the water impermeable seed coat is responsible for dormancy in palm seeds. In previous studies it has been shown that scarification increases the rate of germination of palm seeds with water-impermeable hard endocarp (Nagao *et al*., 1980). In this study 10% Na_2HOCl treatment gave better results in *Livistona rotundifolia* seedsby softening of seed coat, which permits water up take and gas exchange required for germination. 10% Na_2HOCl solution has an ability to protect seeds from fungal infections during germination.

Table 3. Effect of pretreatments on Vigor Index of *Livistona rotundifolia* seeds.

Treatment (T)	Germination %	Mean seedling vigor (cm)	Vigor Index
T1	16.721	23.31	390.66
T2	19.824	23.73	469.18
T3	14.045	23.07	323.61
T4	21.256	23.60	502.14

Conclusions

Seed germination percentage and vigor Index were significantly affected by the seed treatments for *Livistona rotundifolia* seeds. However, none of the treatments had a significant effect on seed moisture content, seedling height and seedling vigor.

References

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