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Effect of cow dung slurry seed treatments on germination and seedling growth in *Melia dubia*

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Abstract

The experiment was conducted in of seed science and technology CCS HAU, College of Agriculture, Bawal during 2023-24, to study the cow dung slurry pre sowing treatments on germination and seedling growth of *Melia dubia*. Capsules were subjected to the seven pre-sowing treatments. On different number of days, the capsules were treated with cow dung slurry treatments and then dried for different number of days in each treatment. The process was repeated for three times in each treatment. The germination of capsule and seedling growth parameters was studied and recorded daily from the commencement of germination to a maximum of 60 days. Results revealed that the pre sowing treatments were significantly increased seed germination percentage compared to control. The higher field emergence percentage (73.0 %) and other seedling parameters viz., hard seeds, days to initial germination, speed of germination, germination energy, mean seedling length, seedling dry weight, Seedling vigour index I and II were recorded in seeds soaked in cow dung slurry treatment for 15 days and dried for 4 days and process repeated for 3 times followed by seeds soaked in cow dung slurry treatment for 15 days and dried for 2 days and process repeated for 3 times (61.0 %). least was in control (27.0 %). Cow dung slurry treatment for 15 days and dried for 4 days and process repeated for 3 times method recommended for seed germination of this species.

Keywords: *Melia dubia*, Seed enhancement, Seed vigour, Cow dung slurry, Seed dormancy

Introduction

Melia dubia, often known as Malabar neem, is a member of the *Meliaceae* family having a chromosome number of $2n=28$, a large deciduous dicotyledonous perennial tree that blooms in the spring. Each endocarp has five locules, housing 1-5 seeds per fruit. The seeds are enclosed in a stony endocarp, pointed smooth and black. The seeds have an average size of 1.5 cm x 0.5 cm and 100 seed weight about 150 g. *Melia dubia* has the unique ability to grow up to 40 feet in two years from planting and may be mechanically harvested Troup (1998) [10].

Seed dormancy evolved differently across plant species by adapting to the prevailing local environment to trigger germination when conditions suit the establishment of a new plant Baskin, J. M. and Baskin, C. C (2004). Dormant seeds require a dormancy breaking treatment to enhance uniform germination. Several methods such as cold water, hot water, mechanical and acid treatment are used for breaking seed dormancy and to improve germination rates in different forest seeds. Some seed treatment methods may also be used to speed up germination in seeds with permeable coats Botsheleng *et al.*, (2014) [5]. *Melia dubia* seeds are hard and may they take up to 3 months to germinate without pre- treatments. Natural germination through seeds is less than 25 per cent. So, there is a need to find an appropriate pre-sowing treatment to enhance seed germination. Pre-treatment should aim at breaking the physical barrier to water absorption and expansion of the embryo. The physiology of the seed will be affected by pre-sowing seed treatments. The purpose of seed treatment is to ensure that seeds germinate quickly and uniformly. The application of seed treatment improves the germination rate and germination process. The majority of dry tropical species are orthodox in nature, which remain dormant because of their rigid seed coat. Seeds immersed in cow dung slurry for 48 hours found to produce good germination and seedling growth. Soaking seeds in water improves the seed's physiology, which

improves germination and related factors Azad *et al.*, (2006)^[2]. Various pre-sowing treatments are routinely employed in nurseries to achieve rapid and uniform germination. Hence to improve seed germination, by using suitable wetting and drying days by using cow dung slurry seed treatment was carried out in the present study.

Material and Methods

The experiment was undertaken in the Seed Science and Technology, CCS HAU, College of Agriculture, Bawal during 2023-24. This summarizes the materials being used and methods being followed to conduct the experiment under poly house condition and described in the following

sub-headings. The mature and healthy capsules were collected from college of forestry, Ponnampet, Karnataka (Figure 1) and capsules (100 seeds x 4 replications) were subjected to the seven pre-sowing treatments with three replications as detailed below. On different number of days, the capsules were treated with cow dung slurry for different treatments and then dried for different number of days in each treatment. The process was repeated for three times in each treatment. The sowed (10x 15 cm Spacing) with CRD design and germination of capsule was studied and recorded daily from the commencement of germination to a maximum of 60 days. Cow dung is taken from livestock department and cow dung and water was used in 1: 1 ratio.



(a) Collection of *Melia dubia* seeds



(b) Slurry treatment and sun drying

Fig 1: Collection of *Melia dubia* seeds for the poly house and laboratory experiment work from College of Forestry, Ponnampet

Treatment details

- **T₁:** Control
- **T₂:** Seeds are soaked in cow dung slurry for 10 days and dried for 2 days and repeated 3 times
- **T₃:** Seeds are soaked in cow dung slurry for 10 days and dried for 4 days and repeated 3 times
- **T₄:** Seeds are soaked in cow dung slurry for 15 days and dried for 2 days and repeated 3 times
- **T₅:** Seeds are soaked in cow dung slurry for 15 days and dried for 4 days and repeated 3 times
- **T₆:** Seeds are soaked in cow dung slurry for 20 days and dried for 2 days and repeated 3 times
- **T₇:** Seeds are soaked in cow dung slurry for 20 days and dried for 4 days and repeated 3 times

Results and Discussion

The results of the present investigation revealed that, the data on all the seed quality parameters differed significantly due to pre-sowing treatments. The *Melia dubia* seeds, soaked in cow dung slurry for 15 days and dried for 4 days and the process repeated for 3 times (T₅) recorded maximum field emergence per cent (73.00 %), speed of germination (2.27), root length (8.60 cm), shoot length (17 cm), seedling length (25.60 cm), seedling dry weight (3200 mg) and seedling vigour index I and II (1869 and 23360 respectively) and minimum abnormal seedling per cent (3.0

%), hard seed percent of (21.0 %), days to initial germination (20.0), germination energy (29 days) (Figure 2). Seeds soaked in cow dung slurry for 15 days and dried for 4 days and the process repeated for 3 times (T₅) and followed by seeds soaked in cow dung slurry for 15 days and dried for 2 days and the process repeated for 3 times (T₄) recorded field emergence per cent (61.00 %), speed of germination (2.13), root length (7.40 cm), shoot length (16.63 cm), seedling length (24.03 cm), seedling dry weight (2700 mg) and seedling vigour index I and II (1466 and 16477 respectively) and minimum abnormal seedling per cent (4.0%), hard seed percent of (32.0 %), days to initial germination (21.0), germination energy (3.0 days). dead seed per cent were on par with each other (3.0 %). under cow dung slurry treatment, the lowest germination percentage was recorded in control (27 %). While significantly maximum abnormal seedling per cent (8.0), dead seed per cent (4), hard seed per cent (61), days to initial germination (31), germination energy (46 days) and minimum speed of germination (0.66), root length (3.70 cm), shoot length (12.00 cm), seedling length (15.70 cm), seedling dry weight (1300 mg), seedling vigour index I and II exhibited (425 and 3503 respectively) were recorded in control (T₁). All the seed quality parameters differed significantly due to pre- sowing treatments. The *Melia dubia* seeds, soaked in cow dung slurry for 15 days and dried for 4

days and the process repeated for 3 times (T5) recorded maximum field emergence per cent (73.00 %), speed of germination (2.27), root length (8.60 cm), shoot seedling dry weight in *Melia dubia*, when the fruits were treated with cow dung slurry for 7 days. Sumbali, *et al.*, (2012) ^[9], Murugesh, (2011) ^[7] working on *Terminalia chebula* and silver oak revealed maximum seedling growth and biomass

production viz., shoot length, collar diameter, dry shoot weight, dry root weight, and total dry seedling weight when de pulped fruits of the species were treated alternately in cow dung slurry (24 hrs) followed by 8 hrs of drying. Similarly, Anand *et al.*, (2012) ^[1], Sanjay Sharma, *et al* (2008) ^[8] reported significantly increased maximum dry root weight, shoot weight.

Table 1: Influence of different cow dung slurry pre-treatments on field emergence (%), abnormal seedling (%), dead seeds (%), hard seeds (%), days to initial germination, root length (cm) and shoot length (cm) of *Melia dubia* seeds under poly house condition

Treatments	Field emergence (%)	Abnormal seedlings (%)	Dead seeds (%)	Hard seeds (%)	Days to initial germination	Root length (cm)	Shoot length (cm)
T ₁	27 (31.30)	8.00 (16.41)	4.00 (11.54)	61.00 (5.36)	31.00	3.70	12.00
T ₂	41 (39.81)	7.00 (15.32)	3.67 (11.02)	48.33 (44.04)	28.00	5.10	12.83
T ₃	45 (42.13)	6.00 (14.18)	3.33 (10.50)	45.67 (42.51)	25.00	5.30	13.10
T ₄	61 (51.36)	4.00 (11.54)	3.00 (9.97)	32.00 (34.45)	21.00	7.40	16.63
T ₅	73 (58.70)	3.00 (9.97)	3.00 (7.95)	21.00 (27.27)	20.00	8.60	17.00
T ₆	54 (47.29)	5.33 (13.34)	3.33 (10.50)	37.33 (37.66)	24.00	5.90	13.30
T ₇	57 (49.03)	5.00 (12.92)	3.33 (10.50)	34.67 (36.07)	22.00	6.70	13.50
Mean	45.66	13.38	10.57	39.05	24.43	6.10	14.05
S.Em ±	0.39	0.37	0.73	0.53	0.62	0.15	0.33
CD (p-0.05)	1.18	1.13	1.19	1.60	1.87	0.44	1.0
F test	*	*	NS	*	*	*	*
CV (%)	1.48	4.82	6.45	2.33	4.38	4.16	4.05

(Figures in parentheses indicate arcsine transformed values and actual values)

Table 2: Influence of different cow dung slurry pre-treatments on speed of germination, germination energy (days), mean seedling length (cm), seedling dry weight (mg) and seedling vigour index I and II of *Melia dubia* seeds under poly house condition

Treatments	Speed of germination	Germination energy (days)	Mean seedling length (cm)	Seedling dry weight (mg)	Seedling vigour index I	Seedling vigour index II
T ₁	0.66	46.00	15.70	1300	425	3503
T ₂	1.24	42.00	17.93	1800	735	7373
T ₃	1.28	38.00	18.40	2100	828	9450
T ₄	2.13	31.00	24.03	2700	1466	16477
T ₅	2.27	29.00	25.60	3200	1869	23360
T ₆	1.67	35.00	19.20	2233	1036	12057
T ₇	1.81	33.00	20.20	2400	1151	13670
Mean	1.58	36.29	20.15	2248	1073	12270
S.Em ±	0.03	0.58	0.34	45.43	20.29	229.68
CD (p-0.05)	0.09	1.75	1.05	137.78	61.55	696.67
F test	*	*	*	*	*	*
CV (%)	3.13	2.76	2.96	3.50	3.28	3.24

Conclusion

The study could be concluded that the drying and wetting method in cow dung slurry seed treatments viz., seeds soaked in cow dung slurry for 15 days and dried for 4 days and the process repeated for 3 times (T5) and seeds soaked in cow dung slurry for 15 days and dried for 2 days and the process repeated for 3 times (T4) were found to be best seed treatment in maintaining the seed quality and seedling performance. The 15 days soaking and 4 days drying in cow dung slurry seeds have given higher number of healthy seedlings in *Melia dubia* which shows that, the wetting and drying seed treatment is economically feasible. This finding can be exploited on commercial basis as best alternative to on-farm treatments. Seed can be treated with cow dung slurry well in advance before sowing.

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