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Unlocking the Growth Potential of *Melia azedarach* Seedlings: The Synergistic Impact of *Glomus mosseae* and Pre-sowing Treatments

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ABSTRACT: *Melia Azedarach* seeds exhibit irregular germination patterns, leading to uneven growth rates among seedlings by implementing pre-germination treatments these seedlings can be nurtured into thriving trees. This study was conducted in the Nursery of the Forestry Department at CCS Haryana Agricultural University, Hisar in 2019. The aim was to investigate the impact of various pre-sowing treatments (including normal water, concentrated H_2SO_4, gibberellic acid, and cow dung slurry) on the growth and biomass of *Melia azedarach* seedlings, both individually and in combination with the mycorrhizal fungi *Glomus mosseae*. The experiments were carried out in a greenhouse from March to October 2019, using a completely randomized design. Each experiment comprised six treatments, including a control group, with *Glomus mosseae* used as a common treatment in every experiment. The experiments were replicated five times. Results showed that *Melia azedarach* seeds soaked in normal water for 72 hours + *Glomus mosseae*, concentrated H_2SO_4 for 8 minutes + *Glomus mosseae*, gibberellic acid 200 ppm for 24 hours + *Glomus mosseae*, and cow dung slurry for 6 days + *Glomus mosseae* exhibited the highest seedling height, root length, root-to-shoot ratio, and seedling vigor after 180 days of sowing. These treatments also resulted in the largest leaf area, highest fresh and dry shoot and root weight, and highest seedling vigor index. Among all the treatments, soaking the seeds in gibberellic acid 200 ppm for 24 hours and sowing them in soil inoculated with *Glomus mosseae* spores was found to be the most effective pre-sowing treatment for promoting vigorous growth and maximizing the biomass of *Melia azedarach* seedlings.

Keywords: *Glomus mosseae, Melia azedarach,* Gibberellic acid, leaf area and seedling vigor.

INTRODUCTION

India, the seventh-largest country in the world, has a total area of 3,287,469 square kilometers. As per the Indian State of Forest Report 2021 by the Forest Survey of India, the country's forest and tree coverage constitute 24.62% of its geographic area, comprising 21.71% forest cover and 2.91% tree cover. *Meliaceae,* the family to which *Melia azedarach* belongs, is a deciduous tree with a short trunk and a spreading crown. Although it originated in the Indian subcontinent, it has spread to various Asian nations and other parts of the world over time (Murugesan *et al*., 2013). This species is highly adaptable and thrives in environments with mean annual temperatures ranging from 23 to 27°C, altitudes up to 1800 meters, and mean annual rainfall between 350 and 2000 mm. While it can grow in a variety of soils, it flourishes best in deep, fertile sandy loam soils (Orwa, 2009). Thanks to its exceptional strength and the ability to obtain high-quality pulp, it has become a valuable raw material.

The *Melia azedarach* tree, known for its ornamental qualities, exhibits rapid growth and is commonly planted alongside roadways. The wood derived from this tree is used in various applications such as toys, compact boxes, athletic equipment, packing boxes, musical instruments, and museum cases. It is also a preferred choice for creating saws and shuttles due to its productivity (Shukla and Bhatanagar 1988). Additionally, the oil obtained from 40% of the seed yield is suitable for lighting purposes (Singh, 1995). The woody tree *Melia azedarach* L. is traditionally employed in treatments for malaria, diabetes, and skin conditions. Moreover, it holds economic and medical significance (Amiri *et al*., 2019). The root colonization by arbuscular mycorrhizal (AM) fungus is an interesting aspect that highlights the potential of *Melia azedarach* as a bio-protectant and biofertilizer. It offers protection against parasitic fungi and nematodes while promoting plant growth and yield (Berruti *et al*., 2016; Wei *et al*., 2016). This mutualistic relationship between AM fungi and plant roots enhances the survival and growth of numerous plant species in natural communities (Lipnicki, 2015). The arbuscles, which are branched hyphae inside the root cells, facilitate nutrient exchange between the fungus and the host plant (Afzal *et al*., 2011).

Melia azedarach is a significant tree species for social forestry projects and is renowned for its therapeutic benefits. Researchers are particularly interested in this species to discover optimal seed germination methods (Azad *et al*., 2010). The present study aims to identify effective techniques for achieving uniform germination of seeds with adequate vigor, which is crucial for generating uniform planting stock.

MATERIAL AND METHODS

A. Planting materials and study site

In the year 2019, an experiment took place at the nursery of the Department of Forestry at CCS Haryana Agricultural University in Hisar. This nursery experiences particularly hot summer days, where the mean monthly maximum and minimum temperatures can reach as high as 48°C. The region also encounters a wide range of relative humidity, varying from 5% to 100%, and during winter, freezing temperatures are common, often accompanied by frost. The objective of the experiment was to assess the growth and germination of Melia azedarach drupes, which were of uniform size.

B. Prepration of inoculum of AM fungi

The pure cultures of *G. mosseae was* collected from Department of Plant Pathology, CCS Haryana Agricultural University, Hisar. It was raised and maintained on pearlmillet (*Pennisetum typhoides*) and wheat (*Triticum aestivum*) under screen house conditions in 30 cm earthen pots containing five kg of sterilized sandy loam soil. Soil application of this AM fungi were applied at the rate of 400-500 sporocarp/kg of soil at the time of sowing of drupes of *Melia azedarach* during 2019 and was evaluated for its performance when pre-treated drupes were sown in *G. mossae* incorporated soil on the survival and growth of *Melia azedarach*seedlings.

C. Experimental design and treatment combinations

A Complete Randomized Design (CRD) was adopted for the study. There were twenty-six treatments including control and 5 replications for each treatment. For each replication two hundred fifty seeds were sown to explore the effect of pre-sowing treatments. After germination, seedlings were allowed to growing for assess initial growth performance. The pre-sowing seed treatments details used in the experiment are furnished below:

- **Seed Treatment:** Each treatment involved the use of 750 Melia azedarach drupes that were chosen at random.
- **Normal Water Treatment:** In this treatment, the seeds were soaked in ordinary tap water for specific durations of 24, 48, and 72 hours. After the soaking period, the seeds were directly sown.
- **Conc. H_2SO_4Treatment:** Seeds were subjected to soaking in concentrated H_2SO_4 for varying durations of 4, 6, and 8 minutes. Subsequently, the seeds were washed with tap water to remove the acid.
- **Gibberellic acid treatment:** For this treatment, seeds were soaked in solutions of gibberellic acid at concentrations of 200, 300, and 400 ppm for 24 hours.
- **Cow dung slurry treatment:** Seeds were immersed in cow dung slurry for different time periods of 2, 4, and 6 days.
- ***Glomus mosseae* treatment:** In this treatment, soil was treated with Glomus mosseae, an arbuscular mycorrhizal fungus. The application rate used was 400-500 sporocarps/kg of soil, and this treatment was applied during the sowing of Melia azedarach drupes.
- **Control seeds:** Seeds in the control group did not undergo any specific pre-sowing treatment.
- **Performance of Seedlings Developed from Treated Seeds:** Seedling height (cm), Root length (cm), Root : Shoot ratio, Seedling vigour index, Collar diameter (mm), Fresh shoot weight (g), Dry shoot weight (g), Fresh root weight (g), Dry root weight (g) and Leaf area (cm2) were measured on five plants which were randomly left to grow in the pots after germination and data was recorded after 90 and 180 days after sowing. Seedling height was measured from the base of the plant at the soil level to the tip of the top most leaf and root length was measured from collar region to the tip of the root. The root length was divided by the shoot length of the same seedling to determine the root: shoot ratio. The collar diameter of the plant was measured at collar region of the seedling by using digital caliper. The root and shoot portion were separated and their fresh weight was recorded then oven dried at 65 0C to constant weight and weight was recorded using digital electronic balance and expressed in grams per seedling. Leaf area was measured by using leaf area meter CI-202. Seedling Vigour Index was calculated by adopting the method suggested by Baki and Anderson (1973) and expressed as number.
- **Seedling Vigour Index** = Germination per cent × Total length of seedling

D. Analysis of Data

Analysis of Variance (ANOVA) was used to examine the impacts of seed treatments, and the Critical Difference at the 5% level of significance was used to estimate whether there were significant differences between the means. The OPSTAT was used to do statistical analysis.

RESULTS

A. Effect of normal water treatment on vegetative growth

(i) Growth performance. The mean shoot length of the seedlings under various treatments was highest (123.98 cm) in Normal water for 72 hrs + *Glomus mosseae** followed by Normal water for 48 hrs + *Glomus mosseae** (123.54 cm), which was significantly higher than that of control and Normal water for 24 hrs (Table 1). Mean root length of the seedlings was found highest (45.93cm) in Normal water for 72 hrs + *Glomus mosseae** followed by Normal water for 48 hrs + *Glomus mosseae** (45.81 cm) and least was observed in control (30.15 cm). There was a significant difference between seeds soaked in Normal water for 72 hrs +

*Glomus mosseae** (0.370) and Normal water for 72 hrs (0.328) and the control (0.333) in root: shoot ratio. Highest collar diameter of *M. azedarach* seedlings was found in Normal water for 72 hrs + *Glomus mosseae** (16.98 mm) followed by Normal water for 48 hrs + *Glomus mosseae** (16.95 mm) and lowest was 12.59 mm (control). The seedling vigour index significantly varied due to the treatments and found highest in Normal water for 72 hrs + *Glomus mosseae** (8971.25) and the lowest (4913.75) was in control (Table 1).

(ii) Seedling biomass production. Fresh shoot and root weight was found highest (41.71 g and 20.51g) in Normal water for 72 hrs + *Glomus mosseae** followed by Normal water for 48 hrs + *Glomus mosseae** (41.62 g and 20.44 g) and least was observed in control (30.52 g and 13.46 g). Shoot dry weight and root dry weight were highest (18.49 g and 9.96 g respectively) in Normal water for 72 hrs + *Glomus mosseae**. However the leaf area per seedling was highest (368.94 cm^2) in Normal water for 72 hrs + *Glomus mosseae** that was significantly different from control (Table 2).

Table 1: Effect of water treatment on growth of *Melia azedarach* seedling.

Treatment	Seedling height (cm)	Root length (cm)	Root : Shoot ratio	Seedling vigour index	Collar diameter (mm)
Normal water for 24 hrs	92.90	30.65	0.330	5501.68	12.69
Normal water for 24 hrs + *Glomus mosseae**	122.53	45.60	0.372	7644.87	16.90
Normal water for 48 hrs	93.97	30.95	0.329	5746.32	12.89
Normal water for 48 hrs + *Glomus mosseae**	123.54	45.81	0.371	7879.86	16.95
Normal water for 72 hrs	94.54	30.99	0.328	6292.82	12.95
Normal water for 72 hrs + *Glomus mosseae**	123.98	45.93	0.370	8971.25	16.98
*Glomus mosseae**	120.52	45.61	0.378	7464.22	16.87
Control (without treatment)	90.67	30.15	0.333	4913.75	12.59
C.D. at 5% level of significance	8.66	3.13	0.027	655.76	1.21

Table 2: Effect of Normal water treatment on biomass of *Melia azedarach* seedling

Treatment	Fresh shoot weight (g)	Dry shoot weight (g)	Fresh root weight (g)	Dry root weight (g)	Leaf area (cm^2)
Normal water for 24 hrs	31.29	13.84	13.64	6.62	322.58
Normal water for 24 hrs + *Glomus mosseae**	41.24	18.28	20.36	9.89	366.84
Normal water for 48 hrs	31.62	13.98	13.82	6.71	323.64
Normal water for 48 hrs + *Glomus mosseae**	41.62	18.47	20.44	9.91	367.89
Normal water for 72 hrs	31.81	14.08	13.83	6.74	322.58
Normal water for 72 hrs + *Glomus mosseae**	41.71	18.49	20.51	9.96	368.94
*Glomus mosseae**	40.54	17.97	20.38	9.89	365.82
Control (without treatment)	30.52	13.50	13.46	6.54	320.58
C.D. at 5% level of significance	2.92	1.29	1.40	0.68	26.51

B. Effect of Conc. H_2SO_4treatment on vegetative growth

(i) Growth performance. The mean shoot length of the seedlings under various treatments was highest (124.54 cm) in Conc. H_2SO_4 for 8 min + *Glomus mosseae** followed by Conc. H_2SO_4 for 4 min + *Glomus mosseae** (123.58 cm), which was significantly higher than that of control (90.67 cm) and *Glomus mosseae** (120.52 cm) (Table 3). Mean root length of the seedlings was found highest (46.97cm) in Conc. H_2SO_4 for 8 min + *Glomus mosseae** followed by Conc. H_2SO_4 for 6 min + *Glomus mosseae** (46.82 cm) and least was observed in control. Similiarly, there was a significant difference was observed between seeds treated with Conc. H_2SO_4 for 8 min + *Glomus mosseae** (0.377) and Conc. H_2SO_4 for 8 min (0.329) in root: shoot ratio. Highest collar diameter of *M. azedarach* seedlings was found in Conc. H_2SO_4 for 8 min + *Glomus mosseae** (17.26 mm) followed by Conc. H_2SO_4 for 6 min + *Glomus mosseae** (17.10 mm) and lowest was 12.59 mm (control). The seedling vigour index significantly varied due to the treatments and found highest in Conc. H_2SO_4 for 8 min + *Glomus mosseae** (10724.52) this is significantly higher than the Conc. H_2SO_4 for 8 min (7538.48) and*Glomus mosseae** (7464.22) (Table 3).

Table 3: Effect of Conc. H_2SO_4 treatment on growth of Melia *azedarach* seedling.

Treatment	Seedling height (cm)	Root length (cm)	Root : Shoot ratio	Seedling vigour index	Collar diameter (mm)
Conc. H_2SO_4 for 4 min	92.95	30.68	0.330	5967.62	12.68
Conc. H_2SO_4 for 4 min + *Glomus mosseae**	123.58	45.55	0.369	8434.51	16.99
Conc. H_2SO_4 for 6 min	93.45	30.80	0.330	6743.05	12.84
Conc. H_2SO_4 for 6 min + *Glomus mosseae**	122.56	46.82	0.382	9439.55	17.10
Conc. H_2SO_4 for 8 min	92.85	30.59	0.329	7538.48	12.62
Conc. H_2SO_4 for 8 min + *Glomus mosseae**	124.54	46.97	0.377	10724.52	17.26
*Glomus mosseae**	120.52	45.61	0.378	7464.22	16.87
Control (without treatment)	90.67	30.15	0.333	4913.75	12.59

(ii) Seedling biomass production: The Conc. H_2SO_4 for 8 min plus *Glomus mosseae** treatment had the highest fresh shoot and root weight (41.91 g and 20.98 g), followed by Conc. H_2SO_4 for 6 min plus *Glomus mosseae** (41.24 g and 20.91 g), with control being the lowest (30.52 g and 13.46 g). In Conc. H_2SO_4 for 8 min plus *Glomus mosseae**, the shoot dry weight and root dry weight were highest (18.58 g and 10.19 g, respectively). However, Conc. H_2SO_4 for 8 min plus *Glomus mosseae** had the maximum leaf area per seedling (365.59 cm^2) and was substantially different from the control (320.58 cm^2) (Table 4).

C. Effect of Gibberellic acidtreatment on vegetative growth

(i) Growth performance. The Gibberellic acid 200 ppm for 24 hrs + *Glomus mosseae** treatment had the highest mean shoot length (151.36 cm), followed by the Gibberellic acid 300 ppm for 24 hrs + *Glomus mosseae** (145.12 cm), which was significantly longer than the control's (90.67 cm) and *Glomus mosseae** (120.52 cm) values. The seedlings' mean root length was highest (55.63 cm) in the Gibberellic acid 200 ppm for 24 hrs + *Glomus mosseae** treatment and the lowest (30.15 cm) in control. Similar to this, a significant difference in the root: shoot ratio was seen between seeds treated with Gibberellic acid 200 ppm for 24 hrs + *Glomus mosseae** (0.368) and seeds treated with Gibberellic acid 200 ppm for 24 hrs (0.353). Gibberellic acid 200 ppm for 24 hrs + *Glomus mosseae** resulted in the largest collar diameter of *M. azedarach* seedlings (24.59 mm) with Gibberellic acid 300 ppm for 24 hrs + *Glomus mosseae** (20.99 mm), while control produced the lowest collar diameter (12.59 mm). Gibberellic acid 200 ppm for 24 hrs + *Glomus mosseae** (14185.02) was determined to have the highest seedling vigor index, which is significantly greater than Gibberellic acid 200 ppm for 24 hrs (10456.87) and *Glomus mosseae** (7464.22) (Table 5).

Table 4: Effect of Conc. H_2SO_4 treatment on biomass of *Melia azedarach* seedling.

Treatment	Fresh shoot weight (g)	Dry shoot weight (g)	Fresh root weight (g)	Dry root weight (g)	Leaf area (cm^2)
Conc. H_2SO_4 for 4 min	31.30	13.86	13.71	6.66	318.25
Conc. H_2SO_4 for 4 min + *Glomus mosseae**	41.60	18.41	20.32	9.88	365.89
Conc. H_2SO_4 for 6 min	31.48	13.92	13.75	6.67	320.95
Conc. H_2SO_4 for 6 min + *Glomus mosseae**	41.24	18.27	20.91	10.15	366.21
Conc. H_2SO_4 for 8 min	31.24	13.81	13.62	6.61	319.85
Conc. H_2SO_4 for 8 min + *Glomus mosseae**	41.91	18.58	20.98	10.19	365.59
*Glomus mosseae**	40.54	17.97	20.38	9.89	365.82
Control (without treatment)	30.52	13.50	13.46	6.54	320.58

Table 5: Effect of Gibberellic acid treatment on growth of Melia *azedarach* seedling.

Treatment	Seedling height (cm)	Root length (cm)	Root : Shoot ratio	Seedling vigour index	Collar diameter (mm)
Gibberellic acid 200 ppm for 24 hrs	115.69	40.85	0.353	10456.87	14.00
Gibberellic acid 200 ppm for 24 hrs + *Glomus mosseae**	151.36	55.63	0.368	14185.02	24.59
Gibberellic acid 300 ppm for 24 hrs	108.59	39.95	0.368	8061.27	13.89
Gibberellic acid 300 ppm for 24 hrs + *Glomus mosseae**	145.12	52.89	0.364	10930.15	20.99
Gibberellic acid 400 ppm for 24 hrs	105.63	38.98	0.369	7558.76	13.59
Gibberellic acid 400 ppm for 24 hrs + *Glomus mosseae**	142.59	52.46	0.368	10507.34	20.59
*Glomus mosseae**	120.52	45.61	0.378	7464.22	16.87
Control (without treatment)	90.67	30.15	0.333	4913.75	12.59

Table 6: Effect of Gibberellic acid treatment on biomass of *Melia azedarach* seedling.

Treatment	Fresh shoot weight (g)	Dry shoot weight (g)	Fresh root weight (g)	Dry root weight (g)	Leaf area (cm^2)
Gibberellic acid 200 ppm for 24 hrs	38.94	17.28	18.27	8.88	362.59
Gibberellic acid 200 ppm for 24 hrs + *Glomus mosseae**	50.94	22.59	24.84	12.08	400.59
Gibberellic acid 300 ppm for 24 hrs	36.59	16.19	17.81	8.69	351.41
Gibberellic acid 300 ppm for 24 hrs + *Glomus mosseae**	48.84	21.67	23.64	11.48	390.58
Gibberellic acid 400 ppm for 24 hrs	35.54	15.76	17.42	8.48	349.48
Gibberellic acid 400 ppm for 24 hrs + *Glomus mosseae**	48.01	21.27	23.44	11.39	386.42
*Glomus mosseae**	40.54	17.97	20.38	9.89	365.82
Control (without treatment)	30.52	13.50	13.46	6.54	320.58

Table 7: Effect of Cow dung slurry treatment on growth of *Melia azedarach* seedling.

Treatment	Seedling height (cm)	Root length (cm)	Root : Shoot ratio	Seedling vigour index	Collar diameter (mm)
Cow dung slurry for 2 days	92.99	30.75	0.331	5576.96	12.72
Cow dung slurry for 2 days + *Glomus mosseae**	126.59	47.63	0.376	8176.14	17.50
Cow dung slurry for 4 days	94.89	31.95	0.337	6595.68	13.12
Cow dung slurry for 4 days + *Glomus mosseae**	129.58	47.92	0.370	10034.08	17.87
Cow dung slurry for 6 days	95.69	32.59	0.341	9287.47	13.45
Cow dung slurry for 6 days + *Glomus mosseae**	130.59	48.25	0.369	13568.59	17.99
*Glomus mosseae**	120.52	45.61	0.378	7464.22	16.87
Control (without treatment)	90.67	30.15	0.333	4913.75	12.59

(ii) Seedling biomass production. Cow dung slurry for 6 days + *Glomus mosseae** had the highest fresh shoot and root weight (43.94 g and 21.55 g), whereas Cow dung slurry for 2 days had the minimum (31.31 g and 13.73 g), with control being the lowest (30.52 g and 13.46 g). In cow dung slurry for 6 days plus *Glomus mosseae**, the shoot dry weight and root dry weight were maximum (19.48 g and 10.47 g, respectively). However, Cow dung slurry for 6 days plus *Glomus mosseae** had the maximum leaf area per seedling (369.49 cm^2), which was significantly greater than control (320.58 cm^2) (Table 8).

Table 8: Effect of Cow dung slurry treatment on biomass of *Melia azedarach* seedling.

Treatment	Fresh shoot weight (g)	Dry shoot weight (g)	Fresh root weight (g)	Dry root weight (g)	Leaf area (cm^2)
Cow dung slurry for 2 days	31.31	13.85	13.73	6.67	320.62
Cow dung slurry for 2 days + *Glomus mosseae**	42.60	18.88	21.27	10.35	366.89
Cow dung slurry for 4 days	31.92	14.14	14.24	6.91	322.69
Cow dung slurry for 4 days + *Glomus mosseae**	43.61	19.30	21.39	10.39	368.38
Cow dung slurry for 6 days	32.21	14.28	14.52	7.06	323.54
Cow dung slurry for 6 days + *Glomus mosseae**	43.94	19.48	21.55	10.47	369.49
*Glomus mosseae**	40.54	17.97	20.38	9.89	365.82
Control (without treatment)	30.52	13.50	13.46	6.54	320.58

DISCUSSION

The present study investigated that among all the pre-sowing treatments Gibberellic acid 200 ppm for 24 hrs + *Glomus mosseae* recorded maximum seedling performance including seedling height (151.36 cm), root length (55.63 cm), root: shoot ratio , collar diameter (24.59 mm), leaf area (400.59 cm2), seedling vigour index (14185.02) and fresh and dry shoot and root biomass (50.94 g, 22.59 g and 24.84 g, 12.08 g, respectively) followed by Gibberellic acid 300 ppm for 24 hrs + *Glomus mosseae* and Gibberellic acid 400 ppm for 24 hrs + *Glomus mosseae*.

This study was correlated with the findings of Suresh and Devakumar (2017), who reported that on treating *Melia dubia* seeds with 100 ppm Gibberellic acid followed by 200 and 2000 ppm concentrations, respectively, increased germination and improved seedling performance. Similar to this, Opoku *et al*. (2018) showed that seeds soaking in hot water led to the highest seedling development in an experiment on *Bauhinia rufescens* seeds. Additionally, Azad *et al*. (2011) demonstrated that *Acacia auriculiformis* seedlings treated with hot water had higher seedling development and collar diameter. Similar research was done on *Terminalia chebula* by Benjamin *et al*. (2019), who observed the highest seedling growth traits and biomass output during the nursery stage from seeds that had been nicked at the broad end and soaked in regular water for 36 hours.

Jha *et al*. (2014) examined the impact of arbuscular mycorrhizal (AM) inoculation on *Pongamia pinnata* seedling growth and came to the conclusion that AM fungus inoculations increase *P. pinnata* biomass. Mycorrhizae inoculation improved the growth indices of *Dombeya torrida, Leucaena leucocephala,* and *Tephrosia vogelii,* according to Mwangi *et al*. (2017). The effects of mycorrhiza on the height, leaf area, root length, and dry weight of *Faidherbia albida* were demonstrated by Shinkafi and Aduradola (2009). Similar to this, Sarwade *et al*. (2017) showed that the mycorrhizal inoculated plant had the maximum dry shoot and root weight when compared to the control. In comparison to other pre-sowing treatments, Attri *et al*. (2015) found that immersing seeds in concentrated H_2SO_4 for 20 minutes resulted in the highest seedling development and biomass attributes in *Sapindus mukorossi.*

CONCLUSIONS

The study's findings demonstrated the significance of pre-sowing interventions for seedling development and biomass production in *Melia azedarach*. Whereas, *Glomus mosseae*-treated seeds had a greater favorable impact on growth and biomass than untreated seeds or seeds treated without *Glomus mosseae*. The seedlings whose seeds were treated with the treatments Normal water for 72 hours + *Glomus mosseae**, Conc. H_2SO_4 for 8 minutes + Glomus mosseae*, Gibberellic acid 200 ppm for 24 hours + *Glomus mosseae**, and Cow dung slurry for 6 days + *Glomus mosseae** were recorded to have the highest levels of seedling height, root length, root: shoot ratio, seedling vigor Out of all of these treatments, Gibberellic acid 200 ppm for 24 hours plus *Glomus mosseae** had the greatest results in terms of growth and biomass. Therefore, *Melia azedarach* seeds should be treated with 200 ppm of gibberellic acid for 24 hours along with *Glomus mosseae* to achieve greater seedling growth and biomass.

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Conflict of Interest. None.

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