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STANDARDISATION OF SEEDLING PRODUCTION IN THAATHIRI (*Woodfordia fruticosa*) (L.) KURZ

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ABSTRACT

Thaathiri (*Woodfordia fruticosa*) belonging to Family Lythraceae is a medicinal plant extensively used in the Ayurvedic system of medicine. The plant flowers profusely and seeds are produced abundantly. Seeds are very fine, powdery in nature; one milligram contains more than 3000 seeds. 70-75% seeds germinate in fine sterile medium, but survival percentage of seedling is very low under normal conditions. Hence trials were carried out at Aromatic and Medicinal Plants Research Station, Odakkali for standardizing a protocol for seedling growth management. Seeds sown in sterilized coir pith compost medium germinated in 15-20 days. The tiny seedlings were then picked up at 5-6 days of germination and transferred to protrays of eight treatments comprising of four types of growing media and three nutrient application treatments. It was observed that growing in sterilized coirpith compost medium with weekly spray of vermiwash or NPK mixture (19:19:19) at 0.2% concentration was effective in achieving 70% survival and good seedling growth. After a month, at 4-5 leaf stage, the seedlings were again transplanted to poly bags containing potting mixture (soil and coir pith compost in 4:1 ratio) and they become ready for field planting within 2-3 months. Thus a two stage transplanting under appropriate management is found essential for successful seedling production of this plant.

KEYWORDS: *Woodfordia fruticosa*, Thaathiri, Medicinal Plant, Propagation

Woodfordia fruticosa belonging to Family Lythraceae is a medicinal plant extensively used in the Ayurvedic and unani systems of medicine. It is a much branched beautiful shrub, 1-4 m high producing numerous bright red flowers in dense, axillary, paniculate cymose clusters. Flowers are the officinal part and it is effective against skin diseases, burning sensation, bilious fever, hepatopathy, verminosis, erysipelas, haemorrhages etc. They are an important ingredient in *Aristams* and *Asavams* as they aid in fermentation. It is an ingredient of a preparation that is used to make barren women fertile (Burkill 1966; Dey 1984). The red dye extracted from the flowers is extensively used throughout India for dyeing fabrics (Das *et al.* 2007). The flowers of this plant possess high content of tannins and they have astringent, acrid, refrigerant, stimulant, styptic, uterine sedative, anthelmintic, constipating, antibacterial, vulnerary, alxeteric and febrifuge properties (Anjaria *et al.,* 2002). A wide range of chemical compounds including tannins, flavonoids, anthraquinone glycosides, and polyphenols have been isolated from this species. Extracts and metabolites of this plant, particularly those from flowers and leaves, possess useful pharmacological activities (Pratap *et al*., 2007). Parekh and Chanda (2007) reported that the plant extract can be used as antimicrobial agents in new drugs for the therapy of infectious diseases caused by pathogens.

It can be propagated using branch cuttings and seeds. Vegetative propagation is difficult as this plant is considered to be a hard-to-root species irrespective of season and hormone treatment (Bahuguna *et al.,*1988; Rajesh *et al.,*1993; Raju *et al.,*1994). Micropropagation techniques in the plant has been standardized by many workers (Krishnan and Seeni (1994), Kokkirala *et al.* (2012), but it is highly sophisticated and costly.

The plant flowers profusely and seeds are produced abundantly. Seeds are very fine, powdery in nature; one milligram contains more than 3000 seeds. 70-75% seeds germinate in fine sterile medium, but survival percentage of seedling is very low as they often die off within a few days of germination. Bhagat *et al.* (1992) observed that seed germination was better in sand and that the seeds stored at normal room conditions remain viable upto 3-4 months. However, seed propagation is not adopted owing to the problems in development of healthy seedlings from the tiny seeds. If this problem is overcome, seed propagation would be a cheap and easy method for multiplication of this medicinally important plant which of threatened status. Hence a study was conducted to standardize a seed propagation protocol for *W. fruticosa.* (Fig. 1 to Fig. 4).

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Figure 1: Plant

Figure 2: Flower

Figure 3: Capsules

Figure 4: Seeds

EXPERIMENTAL METHODS

The study was conducted at Aromatic and Medicinal Plants Research Station, Odakkali during 2016-17. Mature capsules were collected from trees of *W. fruiticosa* maintained in the research station. They were dried in sun and the seeds were extracted by crushing. The powdery seeds were cleaned of debris, sundried and stores in airtight container. Seeds sown in sterilized coir pith compost medium germinated in 15-20 days.The tiny seedlings were then picked up at 5-6 days of germination and transferred to protrays containing four types of growing media viz. Sterilized coir pith compost, Sterilized coir pith + vermicompost in 1:1 ratio, Soil + vermicompost in 1:1 ratio and Non sterilized coirpith compost alone. The seedlings were maintained under three levels of nutrition through weekly spray of vermiwash (5%), NPK mixture (19:19:19) at 0.2% and 0.5% levels along with an untreated control. Seedlings require good sunlight and protection from excess moisture. Hence they were kept in UV roofed rain shelter. After a month, at 4-5 leaf stage, the seedlings were again transplanted to poly bags containing potting mixture (soil and coir pith compost in 4:1 ratio) and maintained for two months. Observations on seedling survival and growth characters were recorded. The experiment was laid out in Completely Randomized Block Design with three replications and the analyzed data are presented.

RESULTS AND DISCUSSION

Data on seedling survival and growth of *W. fruticosa* under different growing media and nutrient application are shown in Table 1. It was observed that both growing media as well as supply of nutrients had significant effect on proper development of the seedling. Survival percentage and growth of seedlings in sterilized coir pith compost was significantly higher compared to non-sterilized media. Media sterilisation is an accepted technique to destroy harmful microbial organisms. Toogood (1987) has stressed the importance of sterilized and fine growing medium for sowing tiny seeds. Growing medium comprising of sterilized coir pith compost + vermicompost 1:1 was found detrimental to seedling survival. This could be attributed to the high proportion of vermicompost in the growing medium. Reduction of plant growth with increasing concentrations of vermicompost has been reported earlier by Lazcano and Dominguez (2010).

Supply of nutrients too had significant influence on seedling growth. Weekly spray of vermiwash 5% or

NPK mixture (19:19:19) at 0.2% concentration showed comparatively better growth as indicated in T2 and T4. Seeds of *W. fruticosa* lack endosperm and hence the seeds respond to external nutrient supply from the initial stage itself. The role of endosperm as a supplier of nutrients to germinating seeds is well documented (Dawei *et al*., 2014). Foliar spray of 19:19:19 NPK at 0.5 % showed a reduction in seedling survival as indicated by treatments T4 versus T5. This is attributed to the toxicity of the tiny seedlings at a higher concentration.

Table 1: Seedling survival and growth of *W. fruticosa* under different growing media and nutrient application (at 1 month stage in protrays)

Treatments (Growing medium and nutrient application)		% of seedlings survived	No of leaves/ plant	Plant height (cm)	Leaf width (cm)	Leaf length (cm)
T1	Sterilized coir pith compost, no nutrient sprays	63.00	7.00	1.30	0.73	1.33
T2	Sterilized coir pith compost, Vermiwash 5% weekly spray	77.80	8.00	1.07	0.67	1.00
T3	Sterilized coir pith compost + Vermicompost 1:1, Vermiwash 5% weekly spray	0.00	-	-	-	-
T4	Sterilized coir pith compost, 19:19:19 NPK 0.2 % weekly spray	77.80	7.00	1.47	0.83	1.40
T5	Sterilized coir pith compost, 19:19:19 NPK 0.5 % weekly spray	22.20	5.33	0.80	0.37	0.67
T6	Soil+Vermicompost in 1:1 ratio, Vermiwash 5% weekly spray	23.80	5.67	0.77	0.40	0.80
T7	Soil+Vermicompost in 1:1 ratio, 19:19:19 NPK 0.5 % weekly spray	4.80	1.33	0.20	0.15	0.31
T8	Non sterilized coirpith compost, no nutrient sprays	52.40	4.33	0.21	0.15	0.40
	CD (0.05)	11.2	1.5	0.3	0.8	0.6

Based on the above observations, a protocol for seedling production in *W. fruticosa* is summarized as below. (Fig. 5 to 8):

- Germinate seeds in sterilized coir pith compost medium
- Uproot 1 week old seedlings and plant in protrays filled with sterilized coirpith compost. Keep the trays under sunlight in rain shelter
- Weekly spray of vermiwash 5% or 19:19:19 NPK 0.2%
- Transplant to poly bags containing soil and coir pith compost in 4:1 ratio at 6-8 leaf stage at 1 month age
- 2-3 months old, 15-20 cm tall, polybagged seedlings are ready for field planting

Figure 5: Germinating Seeds

Figure 6: Transplanted To Protrays

Figure 7: Transplanted To Polybags

Figure 8: Seedlings Ready

CONCLUSION

Due to the tiny nature of seeds, selection of growing medium as well as initial management is very crucial for proper growth of *W. fruticosa* seedlings. Very fine, porous and sterilized growing medium, adequate sunlight with protection from excess moisture, supply of nutrients from early seedling stage, two stage transplanting etc. are found effective for successful seedling production of this plant. When these requirements are fulfilled, the seeds develop into healthy seedlings in 3-4 months. Seed propagation in *W. fruticosa* thus becomes cheap, easy and successful.

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