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Full Length Research Paper

Influence of Potting Media on *Grevillea robusta A. Cunn:* Seedlings at Nursery Stage

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ABSTRACT

Grevillea robusta is a good agroforestry species and is a compatible tree to grow as mixture. Its timber value, coupled with its use as a shade for coffee and live standard for pepper cultivation and because of its positive characteristics has resulted in it being cultivated as a prime species in the coffee belt. So there is need to produce healthy and a vigorous seedling in short duration, at same time optimum nutrient management is one of the techniques to enhance the growth of containerized seedlings. With these points in view the study was carried out in nursery at College of Forestry, Ponnampet. The persual of results showed that the organic manure application was found to be more useful to the *G. robusta* seedlings than the inorganic manure. Better growth was observed when goat, pig and Vermicompost manures were applied, followed by application of split doses of inorganic fertilizers specially nitrogen and potting media. The collar diameter, plant height and leaf production of *G. robusta* was positively influenced by organic manures with the application of Goat manure, Pig manure followed by vermicompost at higher doses.

Key words: *Grevillea robusta*, Nursery, Potting media,

INTRODUCTION

Grevillea robusta alone in Kodagu district contributed more than 50 per cent of the harvested wood from coffee plantations. *G. robusta* is the most preferred shade tree in the coffee plantations. Trees in all coffee plantations are the secondary source of income for the coffee growers, especially, during the lean periods of the coffee crop. Therefore, large scale planting of silver oak is going on in many plantations. This is not only occurring in belts which are climatically suitable for coffee but also in places that lack tree cover and where blossom showers were uncertain (Morbad, 2005). There is a need to raise quality seedlings of Silver oak and also to reduce the gestation period in the nurseries to meet the present demand of seedlings for the coffee plantations. Intensive applied research is needed in the standardization of various aspects of nursery techniques such as optimization of size of the seedling stock, type of potting mixture, nutrient requirements, different sources of locally available nutrients etc. In case of nursery practices followed in majority of the forestry species, they are mostly based on experience rather than on scientific reasoning. Similarly in case of *Grevillea robusta* there is very scanty information on scientifically developed standard nursery practices, particularly the nutrient management aspect.

MATERIAL AND METHODS

The experiment was carried out in nursery at College of Forestry, Ponnampet, coming under the hill zone (Zone 9), Kodagu District of Karnataka State. Ponnampet is situated at 12".20^0 N latitude and 75".56^0 E longitudes and at an altitude of 867 MSL.

One month old seedlings of *Grevillea robusta* were obtained from Forest Department Nursery, Thithimathi, in the beginning of monsoon. Then the seedlings were transferred to the polythene bags of size 15 x 20 cm and where subjected for various treatments.

Treatment imposed

The potting mixture consisting of red earth, sand and FYM in the ratio of 2:1:1 was used as control (T0). The treatment combinations used in the experiment are furnished as follows, four organic manures were tried in three levels giving eleven combinations (treatments T3 to T13) and two treatments (T1 and T2) are due to change in the proportion of sand and remaining 5 treatments (T14 to T18) are various combinations of inorganic fertilizers application making total of 19 treatments (Table 1). Therefore, two different potting mixtures, three levels of four different organic manures and five different combinations of inorganic manures were tried in this experiment.

The experiment was laid out in the nursery by adopting Completely Randomized Design (CRD) with three replications. Randomly selected ten seedlings were used from each treatment in each replication for recording the observations.

Collection of experimental data

Seedling height (cm): The seedling height was measured from ground level to the growing tip of shoot and expressed in cm. Ten seedlings from each treatment of three replications were observed and height was measured using scale.

Collar diameter (mm): Collar diameter was measured at the base just above ground level of the seedling in the poly bags with the help of digital caliper and was expressed in mm.

Number of leaves: The numbers of fully opened leaves were counted in each seedling and average was computed as the number of leaves per seedlings.

Total dry matter of plant (gm): Total dry matter of plant was measured at the end of the experiment (90 days after planting). Seedlings of all the treatments in each replication were harvested and gently washed under running water. Leaf, stem and root were separated and kept in the oven for drying at 80^0 C. Dry weight was recorded until constant weight was obtained.

Statistical Analysis

The data obtained on each parameter was subjected to analysis of variance (ANOVA) as described by Panse and Sukhatme (1967), to asses the effectiveness of the various treatments tried and expressed at 95 per cent confidence level. Data was analyzed using the MSTATC software.

RESULTS AND DISCUSSION

Seedling Height: Organic nutrient sources significantly influenced the seedling height of *Grevillea robusta* at different growth stages (Fig. 1). The treatment T16, among different inorganic nutrient treatments showed significant increase, compared to all. Among the organic nutrients tried, highest concentrations of goat manure, Vermicompost and Pig manure have shown maximum increase in plant height of about (307 per cent) was seen in seedlings treated with highest concentration of goat manure. Many studies have shown similar results. Bergamann *et al.* (1997) and Rai, (1999) have shown that application of pig manure is highly useful for attaining good height in case of *Ficus infectoria* and *Ficus religiosa*. Umesh *et al.* (2007) concluded that use of different organic manures had a significant influence on growth by enhancing the seedling height.

Collar diameter: at the end of the experiment collar diameter was positively influenced by organic fertilizers (Table 2), such as goat manure (T10), pig manure (T13) followed by FYM (T4) and vermicompost (T7). Collar diameter was found to be increase, as high as 161 per cent at 90 days in response to highest dose of pig manure. Rathakrishnan, (2001) showed that, use of organic manure increased the collar diameter (0.66 mm) in *Simarouba glauca.* Similar results were also reported in *Pinus storobes* by Stephens and Hill, 1973 and also in *Albizzia lebbeck* by Rao and Singh, 1985. There was lot of variation in the collar diameter among seedlings imposed with different combination of inorganic nutrients. The treatment viz T16 was the only treatment combination where there was significant increase in the collar diameter. In case of T14, in fact application of higher dose of nitrogen proved to be deleterious. All the seedlings exposed to this treatment succumbed to mortality due to the high concentration of nitrogen applied. In other treatment combinations, there was no appreciable increase in collar diameter. Therefore, in case of inorganic nutrients it is necessary to choose right concentration as well as combination of nutrients to get desired results (Rangasawamy, *et al.*, 1990).

Number of leaves: Organic nutrient sources significantly influenced the production of leaves after 90 days of treatment. It did not show much variation among the treatments such as potting media and inorganic nutrient treatments, except in T16 treatment. In general it was more in most of the organic nutrient treated plants (Table 2). Earlier studies conducted on other tree species have also reported similar results, (Sailaja *et al.*, 2007; Umesh *et al.*, 2007; Prasad *et al.*, 2007 and Verma *et al.*, 1999).

Total dry matter of plant / Biomass: In the present study it is found that highest response in terms of biomass accumulation was seen in the seedlings treated with organic source of nutrients (Fig. 2) followed by the inorganic nutrient treatments (T16), this is mainly due to the higher growth attributes *viz.*, collar diameter, plant height and production of more number of leaves in the seedlings. While seedlings treated with no additional nutrients showed low biomass accumulation and all the other treatments of inorganic nutrient treatments showed similar response, while yet another inorganic treatment where higher dose of nutrient provided proved to be deleterious (T14). Among the organic nutrients treatments the best was found to be goat manure treated plants. Tiwari and Saxena (2003) observed that *Dalbergia sissoo* seedlings growth had increased with increase in the organic manure combination, which indicated higher dry matter accumulation in the seedlings.

Table: 1. Details of the treatment combinations of the study

T0 (control)	**Potting mixture at 2:1:1 (Soil:Sand:FYM)**		
T1	2:1.5:1		
T2	2:2:1		
Organic Manures (FYM)	**(Soil:Sand:FYM)**		
T3	2:1:2		
T4	2:1:2.5		
Vermicompost	**(Soil:Sand:vermin compost)**		
T5	2:1:1		
T6	2:1:2		
T7	2:1:2.5		
Goat manure	**(Soil:Sand:goat manure)**		
T8	2:1:1		
T9	2:1:2		
T10	2:1:2.5		
Pig manure	**(Soil: Sand: pig manure)**		
T11	2:1:1		
T12	2:1:2		
T13	2:1:2.5		
Inorganic fertilizers			
T14	**(N)** 1.5 gm	**(P)** 1.0 gm	**(K)** 1.0 gm
T15	1.0 gm	1.0 gm	1.0 gm
*T16	0.75 + 0.75 gm	1.0 gm	1.0 gm
T17	0.5 gm	1.5 gm	1.0 gm
T18	0.5 gm	1.0 gm	1.5 gm

NOTE: *** N** was applied in two split doses at two months interval

Table. 2: Variation in collar diameter and number of leaves of *Grevillea robust* at 90 DAT (Days after Treatment)

Treatments	**Collar diameter (mm)**		**Number of leaves**	
	Initial	**Final (90 DAT)**	**Initial**	**Final (90 DAT)**
Control	1.02	1.63 (59)	07.70	18.05 (134)
T1	1.29	2.36 (47)	08.73	19.76 (126)
T2	1.27	2.22 (46)	08.67	19.67 (127)
T3	1.12	2.07 (46)	07.60	18.33 (141)
T4	1.43	3.06 (113)	10.40	22.03 (106)
T5	1.36	2.64 (61)	09.93	21.32 (115)
T6	1.39	2.70 (57)	10.00	21.41 (114)
T7	1.42	3.04 (114)	10.07	23.80 (136)
T8	1.53	2.61 (70)	11.76	20.93 (78)
T9	1.46	3.08 (57)	11.07	22.87 (106)
T10	1.34	3.53 (161)	09.13	23.60 (158)
T11	1.35	2.62 (57)	09.80	20.93 (113)
T12	1.67	2.94 (76)	11.10	24.77 (123)
T13	1.35	3.29 (145)	09.87	21.00 (113)
T14	1.71	---------	12.93	----------
T15	1.30	2.49 (47)	08.90	20.73 (133)
T16	1.48	3.03 (105)	11.57	23.17 (100)
T17	1.14	2.18 (91)	08.27	18.42 (123)
T18	1.21	2.19 (80)	08.30	19.24 (132)
C.D @ 5 %	**NS**	**0.45**	**02.04**	**02.84**

Note: Values in the parenthesis indicate the percent increase over the initial values

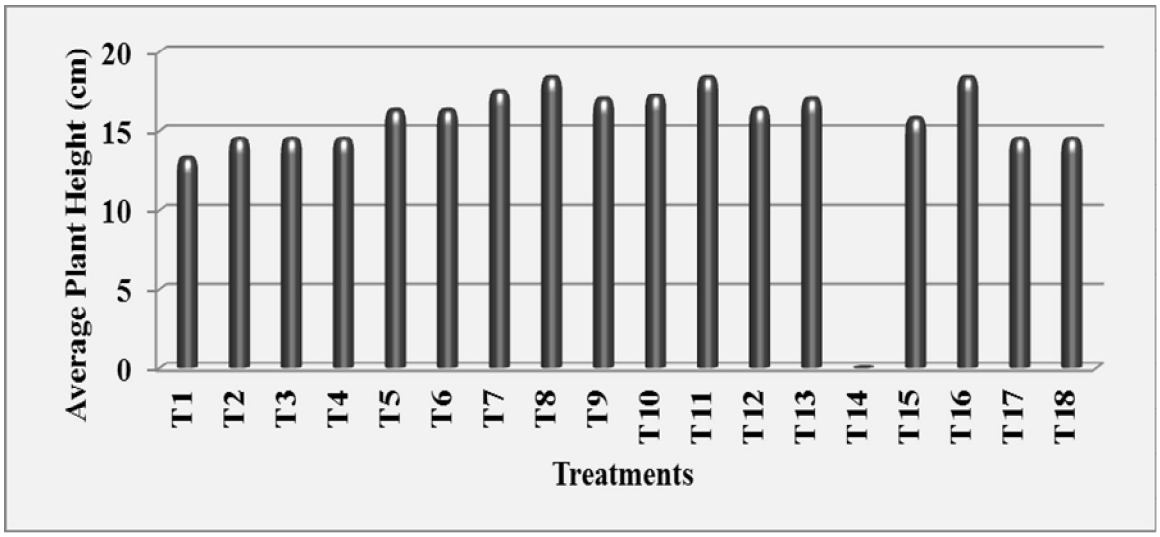

Figure 1: Variations in plant height of *Grevillea robusta* in various treatments at the end of the experiment.

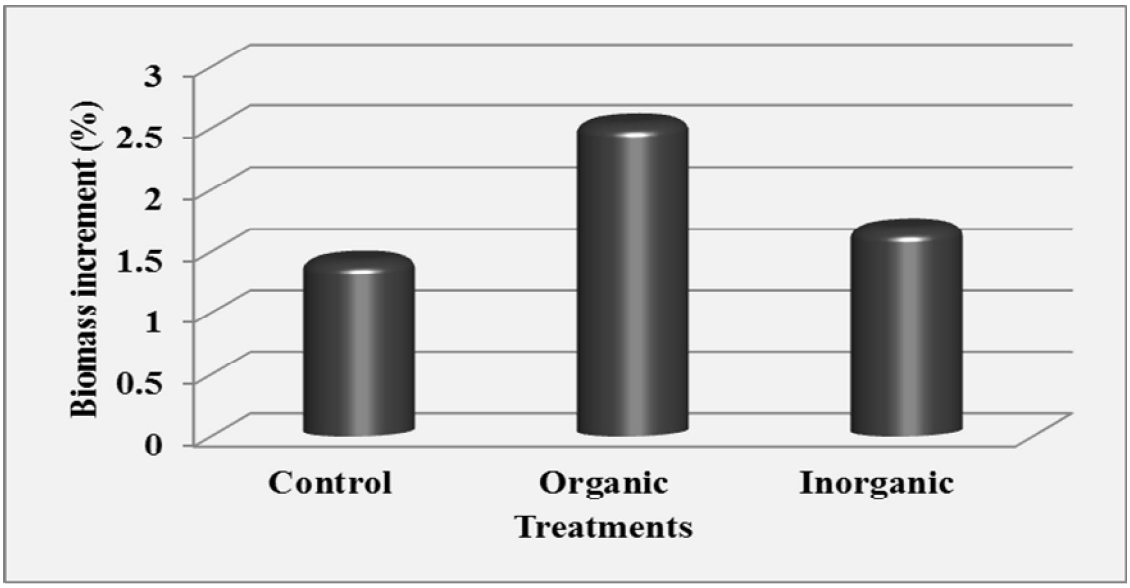

Figure: 2 Influence of organic and inorganic nutrients on TDM in *Grevillea robusta* seedling.

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