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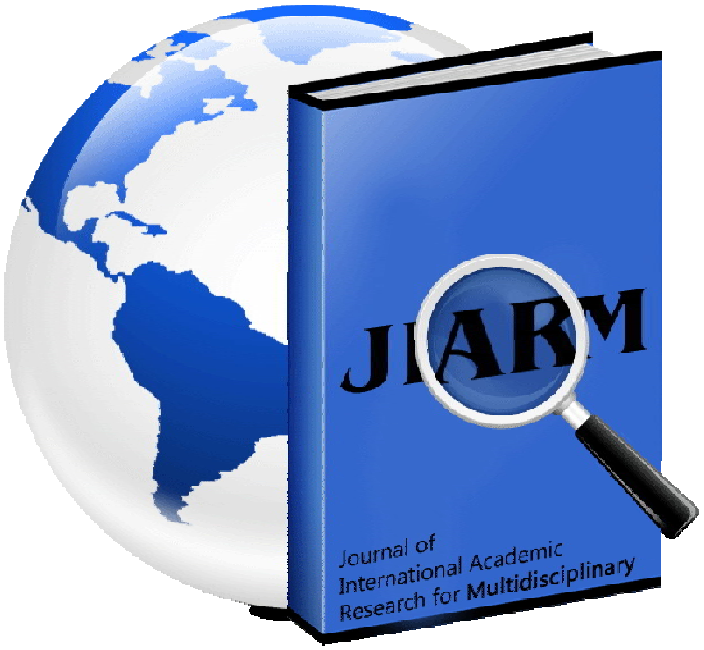

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EFFECT OF INTEGRATED PLANT NUTRITION SYSTEM ON BIO-CHEMICAL PARAMETERS OF DALBERGIA LATIFOLIA (ROSE WOOD) SEEDLINGS

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ABSTRACT

The study was conducted at Forest College and research institute, Mettupalayam, during November-2011 to March-2012, to know the effect of manures and fertilizers on bio-chemical parameter of the Dalbergia latifolia seedlings. Among the fourteen different treatments, the treatment with 100 mg of N, 200 mg of P_2O_5 and 100 mg of K_2O along with vermicompost (5g), Azophos (10g) and VAM (5g) per seedlings showed significantly maximum chlorophyll 'a' content, chlorophyll 'b' and total chlorophyll content (2.00 mg g^{-1}, 1.03 mg $g^{-1}$and 3.73 mg g^{-1} respectively). Which was followed by 100 mg of N, 200 mg of P_2O_5 and 100 mg of K_2O along with vermicompost (5g) and Azophos (10g) per seedlings showed seedling attributes viz., chlorophyll 'a' content, chlorophyll 'b' and total chlorophyll content (1.85 mg g^{-1}, 0.83 mg $g^{-1}$and 3.42 mg g^{-1} respectively). Dalbergia latifolia seedlings bio-chemical parameter viz., chlorophyll 'a' content, chlorophyll 'b' and total chlorophyll content in control was remarkably low throughout the experiment.

KEYWORDS: Dalbergia Latifolia, Rose Wood**,** Chlorophyll, Fertilizers.

INTRODUCTION

Dalbergia Linn. f. commemorates the Swedish botanist, Nicholas Dalberg. It belongs to the family Leguminosae and comprises of 300 species occurring in the tropical and subtropical regions of the world. Twenty seven species of this genus are distributed in India. Of this, 15 are indigenous and 3 are endemic (Thothathri, 1987). Dalbergia species show a variety of habitat viz. lianas, shrubs and trees. The genus is important from silvicultural and economic point of view. Some of the trees possess white wood without heartwood and, therefore have no economic value. Whereas some are of great value owning their dark coloured, ornamental heart wood e.g. Dalbergia sissoo Roxb. (Shisham) and Dalbergia latifolia Roxb. (Rose wood, Black wood). Dalbergia latifolia is a premium-quality timber species internationally known as "Indian Rosewood". The tree is commonly called sitsal, beete, shisham or Bombay black wood in India. East Indian Rosewood (Dalbergia latifolia) is

one of the darker rosewoods on the market, with heartwood varying in colour from rich rose to deep brown. It is quite popular among wood turners and wood carvers, as well as fine furniture makers and musical instrument makers.

East Indian Rosewood is considered a "tone wood" due to its consistent acoustic qualities and came into wide use in the mid 1960 as a substitute for Brazilian Rosewood (which was overharvested and became an endangered species) in making guitar backs and sides. It is used to make premium-grade furniture, panelling, veneers and interior and exterior joinery. Secondary uses of the wood include knife handles, musical instrument, calico-printing blocks, mathematical instruments, agricultural implements and boat keels and screws .Tannins from the bark is used to produce medicines for the treatment of diarrhoea, worms, indigestion and leprosy. Tannin is also used to produce an appetizer. The natural range of Dalbergia latifolia stretches from the sub-Himalayan tract to the southern tip of India and the island of lava in Indonesia (Kadambi, 1954). In India, it is prevalent upto 600m of altitude, sometimes ascending upto 1370 m. During 1873, plantations were developed in Java. The species has also been introduced into African countries, including Nigeria, Tanzania and Kenya. The absolute maximum shade temperature which the tree can withstand in its natural habitat varies from 37.5-50 ^{o} C and absolute minimum temperature from 0-15 ^{o} C. Dalbergia latifolia grows on a variety of geological formation, including gneiss, laterite, boulder deposits and alluvial formations, but it requires good drainage and attains its best development where the soil is deep and moist. It prefers good, deep loam or clayey soil, containing lime. It also grows fairly well on black cotton soil and accommodates itself to poor, dry and stony soil.

Material and methods

The study was conducted at Forest college and research institute, Mettupalayam, during November-2011 to March-2012. The aim of study was to find the effect of manures and fertilizers on bio-chemical parameter of Dalbergia latifolia seedlings. For this purpose 45 days old seedlings raised in nursery beds were planted in polybags (25 cm X 15 cm) size containing nursery medium soil and FYM in the ratio of 3:1. The calculated quantity of organic and biofertilizers (Azospirillum and Phosphobacteria) were added to the respective poly bags as per the treatment schedule at transplanting. The inorganic fertilizers were added as aqueous solution to each poly bags seven days after transplanting So for the convenience in presentation the same are mentioned as N, P and K. Fourteen different treatments were considered for study are given below,

Treatment	Nutrient applied g/seedling
T_1	Control
T_2	Vermicompost (5g)
T_3	Azophos (10g)
T_4	VAM (5g)
T_5	Azophos (10g) + VAM (5g)
T_6	50:100:50 mg NPK
T_7	50:100:50 mg NPK+ Azophos (10g)
T_8	50:100:50 mg NPK + Azophos (10g) + VAM (5g)
T_9	100:200:100 mg NPK
T_{10}	100:200:100 mg NPK + Azophos (10g)
T_{11}	100:200:100 mg NPK + Azophos (10g) + VAM (5g)
T_{12}	200:400:200 mg NPK
T_{13}	200:400:200 mg NPK +Azophos (10g)
T_{14}	200:400:200 mg NPK + Azophos (10g) + VAM (5g)

Biochemical index at 90 DAT of growth, the fresh plant samples were collected at different growth stages and analyzed for chlorophyll content. The chlorophyll was estimated adopting the method of Yoshida et al. (1971) and expressed as mg per gram of fresh weight. Recently matured fresh leaf samples of 250 mg were collected and washed in distilled water and then ground with 10 ml of 80 per cent acetone using pestle and mortar. The homogeneous solution was centrifuged at 500 rpm for 10 minutes. The supernatant was collected and the volume was made upto 25 ml using 80 per cent acetone. The optical density of the content was measured at 663, 652 and 645 nm. The chlorophyll a, chlorophyll b and total chlorophyll content were calculated using the following formula.

$$\text{Chlorophyll a (mg g}^{-1}) = \frac{12.7 \times OD \text{ at } 663 - 6.29 \times OD \text{ at } 645 \times V}{1000 \times W}$$

$$\text{Chlorophyll b (mg g}^{-1}) = \frac{22.7 \times OD \text{ at } 645 - 4.68 \times OD \text{ at } 663 \times V}{1000 \times W}$$

$$\text{Total chlorophyll (mg g}^{-1}) = \frac{OD \text{ at } 652 \times 1000 \times V}{34.50 \times 1000 \times W}$$

Where,

V = volume made (25 ml)

W = weight of fresh sample taken (250 mg)

Results and discussion

Chlorophyll 'a' content, chlorophyll 'b' and total chlorophyll content varied significantly due to influence of manures and fertilizers over control are presented in Table-1.

Table 1. Bio-chemical parameters of Dalbergia latifolia seedlings as influenced by manures and fertilizers at 90 days after planting

Treatments	chlorophyll 'a' (mg g^{-1})	chlorophyll 'b' (mg g^{-1})	Total chlorophyll content(mg g^{-1})
T1 - Control	1.43	0.59	2.28
T2 - Vermicompost (5g)	1.67	0.73	3.18
T3 - Azophos (10g)	1.65	0.72	3.06
T4 - VAM (5g)	1.60	0.71	2.80
T5 - T3 + T4	1.64	0.81	3.13
T6 - 50:100:50 mg NPK	1.57	0.78	3.23
T7 - T6+T3	1.58	0.79	3.03
T8 - T6 + T5	1.73	0.79	3.13
T9 - 100:200:100 mg NPK	1.74	0.72	3.28
T10 - T9 + T3	1.85	0.83	3.42
T11 - T9 + T5	2.00	1.03	3.73
T12 - 200:400:200 mg NPK	1.72	0.71	3.03
T13 - T12 + T3	1.61	0.76	2.98
T14 - T12 + T5	1.60	0.76	3.22
SEd	0.05	0.05	0.14
CD (P=0.05)	0.10	0.10	0.29

Application of 100 mg of N, 200 mg of P_2O_5 and 100 mg of K_2O along with vermicompost (5g), Azophos (10g) and VAM (5g) per seedling (T_{11}) increased the chlorophyll content and this might be ascribed to that the crop has better balanced nutrition especially N and K from inorganic source and P from both inorganic and biofertilizers sources and hence enhanced chlorophyll content.

The present findings were in accordance with Mahatim Singh et al. (1983) who reported that biofertilizer inoculation to plant increased the chlorophyll content by the supply of higher amount of nitrogen to growing tissues. Latha et al. (1996) reported that the application of N, P and K fertilizers to Anacardium occidentale, significantly affected the chlorophyll b content of leaves.

The same findings were in consonance with Amol (2009) and Ramasamy (2009) and Bharath (2011) reported that the application of VAM, Phosphobacteria, and Azospirillum along with NPK recorded the maximum chlorophyll content of Bambusa vulgaris, Bixa orellana and Acrocarpus fraxinifolius seedlings.

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