



Influence of Vermicompost and Vermiwash in Growth Enhancement of *Gmelina arborea* Under Nursery Conditions

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Received 30 September 2016; accepted in revised form 14 November 2016

Abstract: The present study was carried out to record changes in growth performance of *Gmelina arborea* under nursery conditions. Three phased supplementation of vermicompost and vermiwash in separate and combined experimental sets has exhibited good growth promotion of *G. arborea* seedlings at 120 days. The results indicated that plant growth in terms of shoot height, root length, leaf area and biomass was enhanced in the soil treated with vermicompost as compared to the non treated control. Impact of vermiwash on growth of plant has also been observed and it was very well comparable to the untreated control plants. However, combination of both did not affect much the performance of tree seedlings.

Key words: *Gmelina arborea*, tree, vermicompost, vermiwash, growth.

Introduction

Gmelina arborea is a fast growing deciduous tree commonly known as ‘Gambhar’. It is widely spreaded in India and also found in north-east Asia. Several reports are available on its antibacterial, antifungal, antioxidant and antidiabetic activities^{4,6,8}. It has medicinal value due to alkaloid content in leaves and roots and used for treatment of diarrhea, high blood pressure, malaria and insect stings^{3,5}. It is fast growing, good strength and medium density wood which provides a general utility timber. It is an ideal choice for large-scale afforestation programmes but problem lies on its establishment and vigorous growth under field conditions which requires lot of fertilizer input as a result escalate the individual cost of seedlings. Supplementation of organic manure like vermicompost and vermicompost are proved as an alternative to overcome such difficulties¹.

Vermicompost is rich in plant nutrients, micro-biologically active organic material formed from interaction among earthworms and microbes in

decomposing process of organic materials. It has been used widely as vital organic manure and provide a constant and balanced supply of nutrients, improve the organic matter and humus to the soil and supports plant growth and development^{7,9,10,11,12}. In the present study, the effects of vermicompost and vermiwash were investigated on some morphological characteristics in the production of *Gmelina arborea* seedlings under nursery conditions.

Materials and methods

The study was carried out during May-September 2015 in the experimental fields of the Regional Plant Resource Centre, Bhubaneswar, India. The experiment was done in poly bags (size: 12 x 16 cm containing 5.5 kg red laterite soil). Soil was fumigated with 1 % formalin (25 ml /pot) for 48 h prior to the experiment. Seeds of *G. arborea* were collected, embedded in hot water and sown under different treatments namely (1) control, (2) vermicompost (100 g/pot), (3) vermiwash (100

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ml/pot), (4) vermicompost and vermiwash (100 g /pot, 100 ml/pot). Each pot received 2 seeds but ultimately a single seedling was maintained in each pot. Plants were watered twice a day through sprinkler. Seedlings developed after 120 days were uprooted and observed for shoot height, number of leaves, number of branches, leaf area, wet biomass and dry biomass. All data recorded in 10 replication for each experimental sets.

Results and discussion

The experiment carried out on *Gmelina arborea* supplemented with vermicompost and vermiwash separately and/or combinidly under nursery conditions have exhibited promising impact of organic manure on growth and development of plants. Addition of vermicompost enhanced the Plant height i. e root length and shoot height .

Impact of vermiwash supplementation did not show any effect in this regards (Fig. 1 and 2, Plate-1). Total number of leaves recorded in untreated plants were higher as compared to other treatments. However, the effect of vermiwash and vermicompost was clearly visible for the growth promotion of plants as leaf area recorded for treated plants were higher as compared to the control (Fig. 3). The data recorded for biomass of *G. arborea* seedling grown under different treatments are depicted in figs. 5-8. It was observed that vermicompost supplementation enhanced the biomass of shoot as well as root in the treated plants.

The effect of vermicompost and vermiwash on plant growth is reported well ¹⁰. It is not only the nutrient factors available in the vermicompost helps in plant growth rather microbial biomass resides in the organic manure exhibit growth pro-

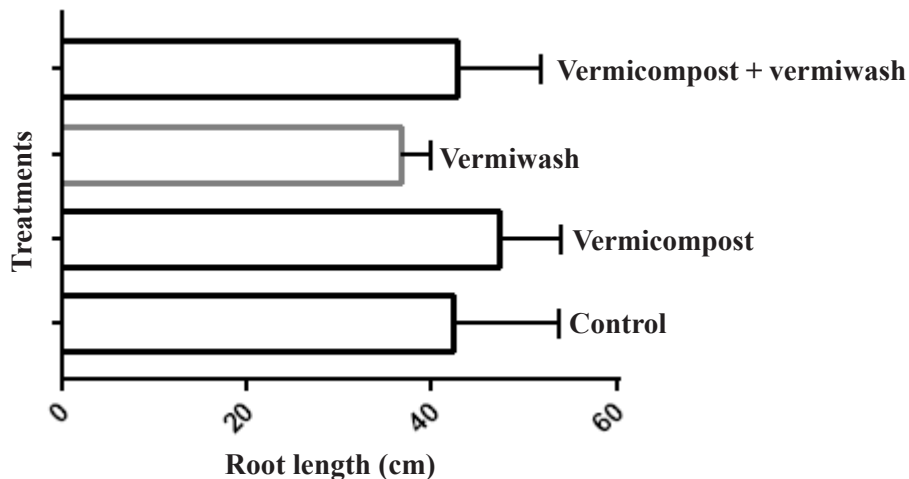


Fig. 1. Effect of organic manure on root length of *G. arborea*

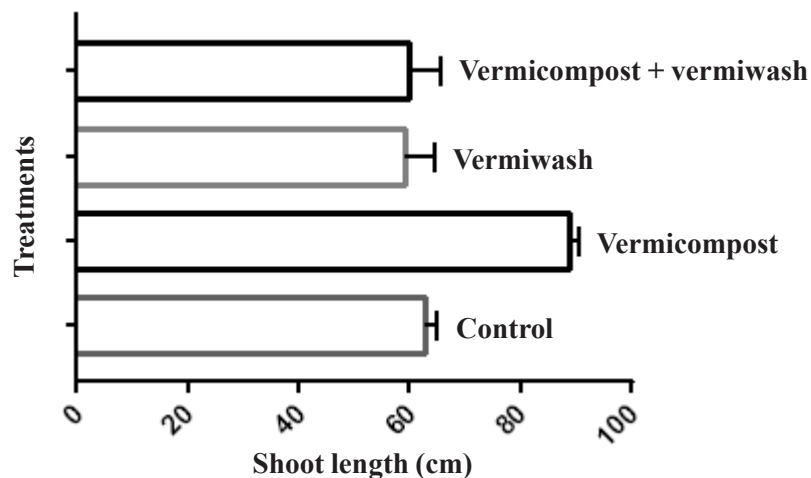


Fig. 2. Effect of organic manure on shoot height of *G. arborea*

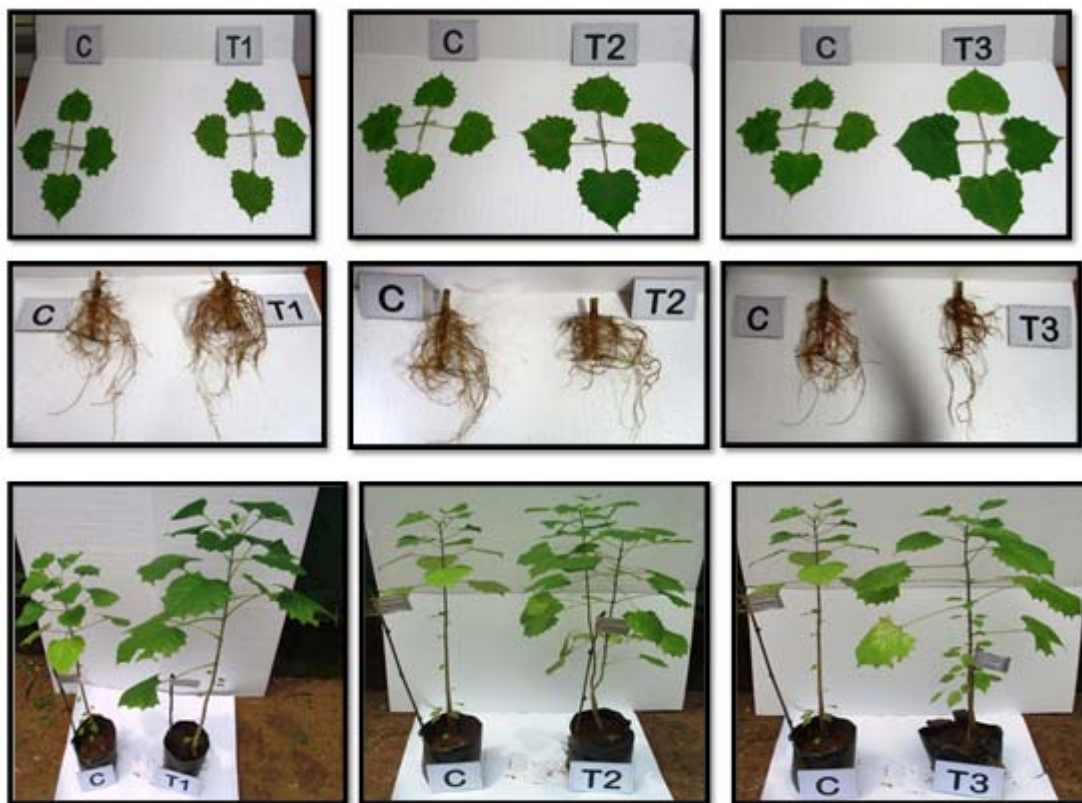


Plate 1. Impact of vermicompost and vermiwash on *Gmelina arborea* under pot culture conditions 120 days (C- control, T1- vermicompost, T2- vermiwash, T3- vermicompost+vermiwash)

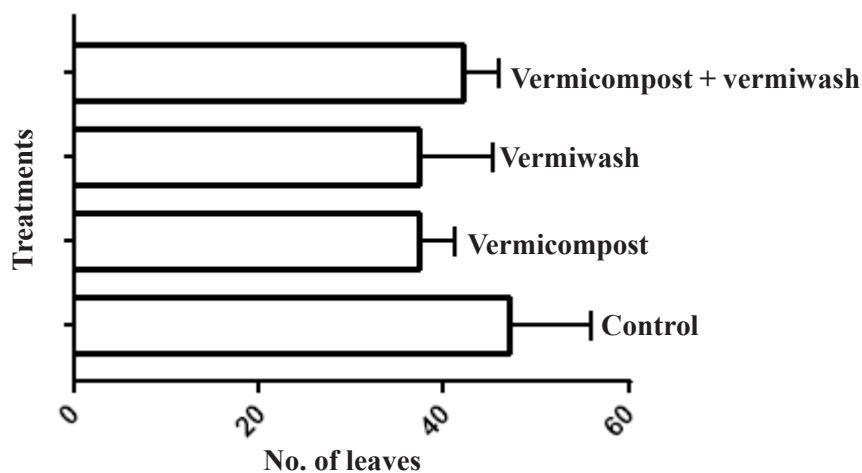


Fig. 3. Effect of organic manure on leaf number of *G. arborea*

moting activity¹¹. It has also been suggested that the use of organic fertilizers together with chemical fertilizers, compared to the addition of organic fertilizers alone, had a higher positive effect on microbial biomass and hence soil health². The growth enhancement of *G. arborea* in soil media aided with organic manure is clearly evident in

the present study.

To develop nursery package of practice, more experimentations on quantity of organic manure, schedule of supplementations, age of the seedling are required for this forest tree species which is fast growing but having establishment problem in field conditions .

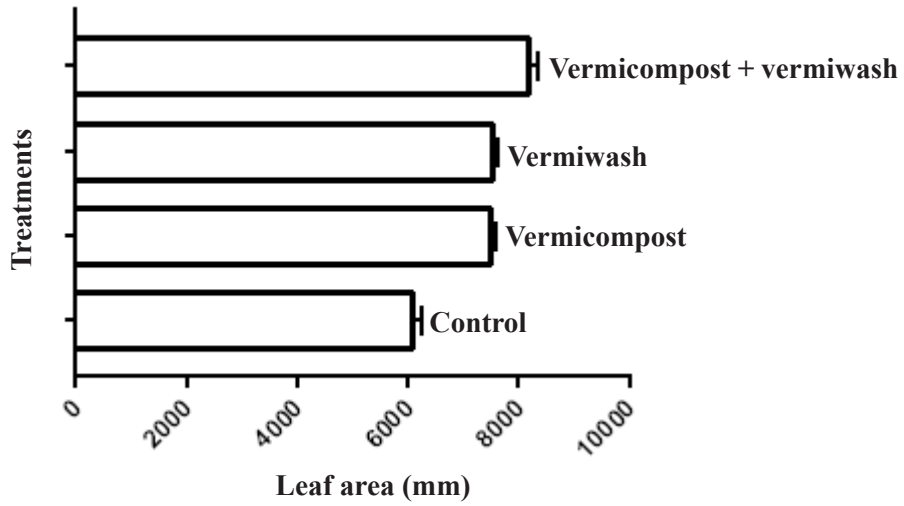


Fig. 4. Effect of organic manure on leaf area of *G. arborea*

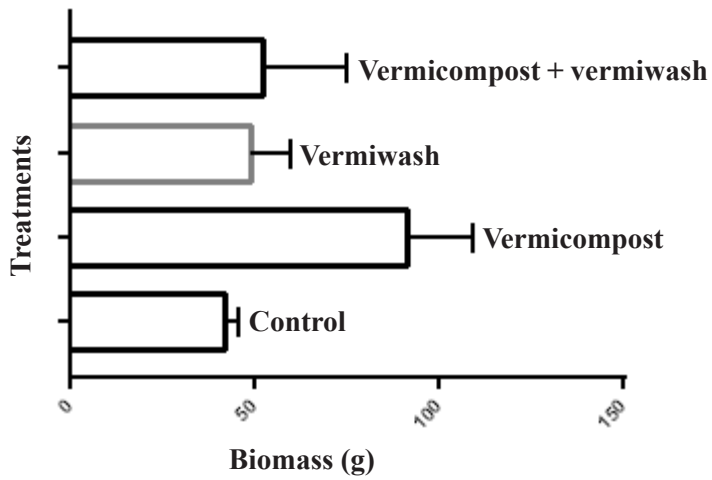


Fig. 5. Effect of organic manure on wet biomass (shoot) of *G. arborea*

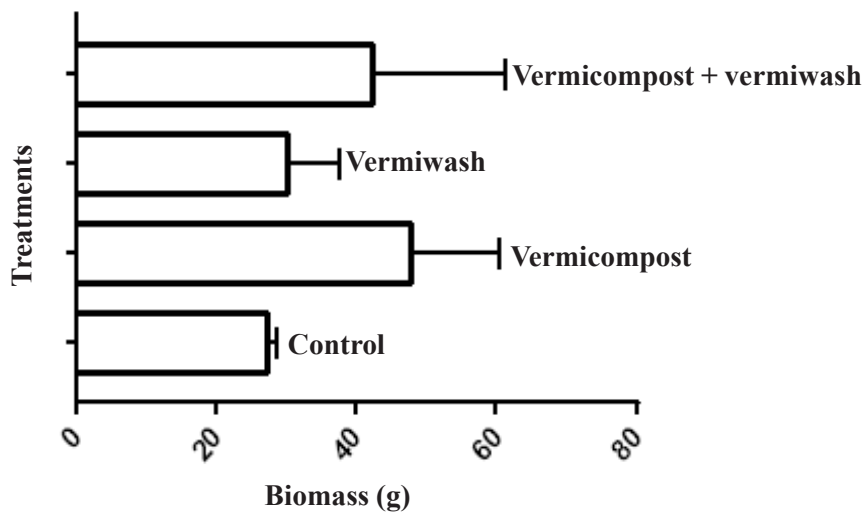


Fig. 6. Effect of organic manure on wet biomass (root) of *G. arborea*

Acknowledgements

The financial assistance obtained from Forest

and Environment Dept., Govt. of Odisha under

State Plan 2015-16 is gratefully acknowledged.

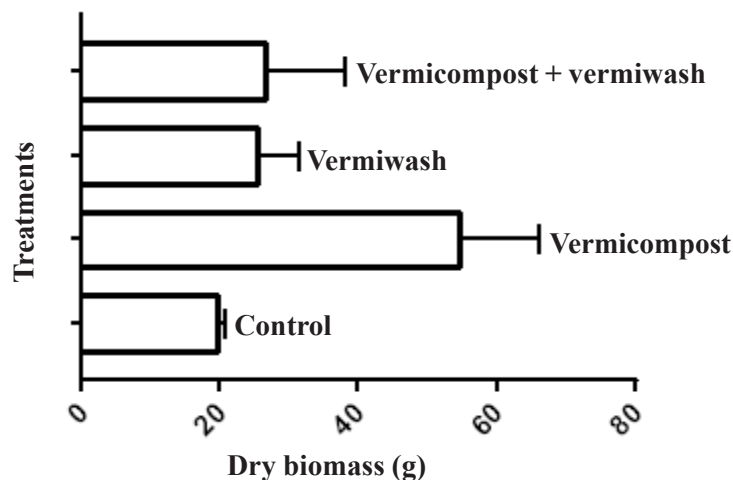


Fig. 7. Effect of organic manure on dry biomass (shoot) of *G. arborea*

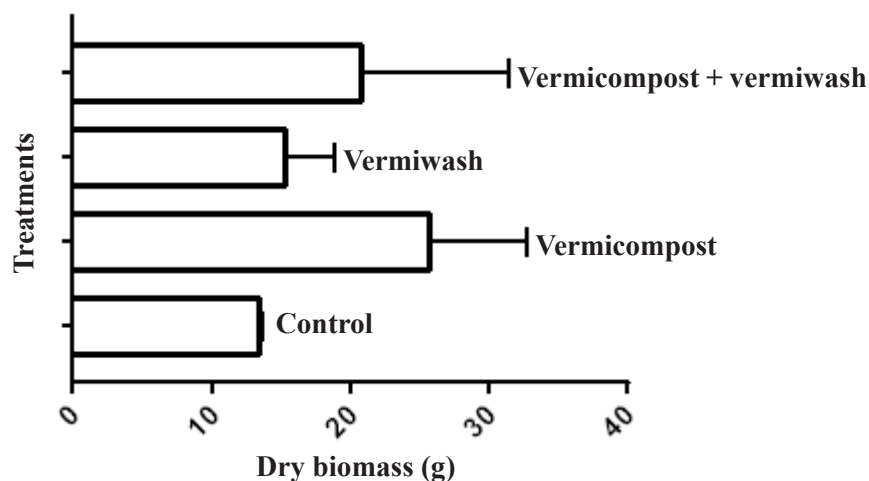


Fig. 8. Effect of organic manure on dry biomass (root) of *G. arborea*

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