

## SOIL MICROBIAL INOCULA ON SEED GERMINATION AND SEEDLING GROWTH OF *Manilkara hexandra* Roxb. (PALU)

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*Manilkara hexandra* (Roxb.) (*Palu*) is one of the dominant tree species of the dry mixed evergreen forests in Sri Lanka. *M. hexandra* is indigenous and endangered tree species of Sri Lanka. It was noted that in the dry zone forests, seed germination and establishment of *Palu* was remarkably low. Therefore, finding the way of successful seed germination and establishment of *Palu* is considered most important in dry zone forest regeneration programs in Sri Lanka. The goal of the present study was to investigate different microbial inocula such as arbuscular mycorrhizal fungi (AMF), *jeewaamurthum* (consortium of native soil bacteria and fungi) compost and bio-char for the seed germination and the seedling establishment of *Palu*.

A pot experiment was conducted in the green house at the Rajarata University of Sri Lanka, Mihintale. One kilogram of surface soil (0-15 cm depth) of the field in Mihintale was dispensed into each pot. Water content was set to 75% of the water capacity. Control and ten other treatments were applied in randomized complete block design with three replicates. Treatments included, field soil only as control, arbuscular mycorrhizae, *jeewaamurthum* bio-char, compost, inorganic fertilizer, combination with other treatments and arbuscular mycorrhizae and all microbial inocula together (Figure 1). *Palu* seeds were dipped in distilled water for three days and five seeds each were sown per pot. After two weeks of growth seed germination rate was determined. Plants were uprooted after 21 weeks and percentage arbuscular mycorrhizal colonization of roots was estimated following standard procedures. Relative growth rate and shoot biomass were taken as growth parameters.

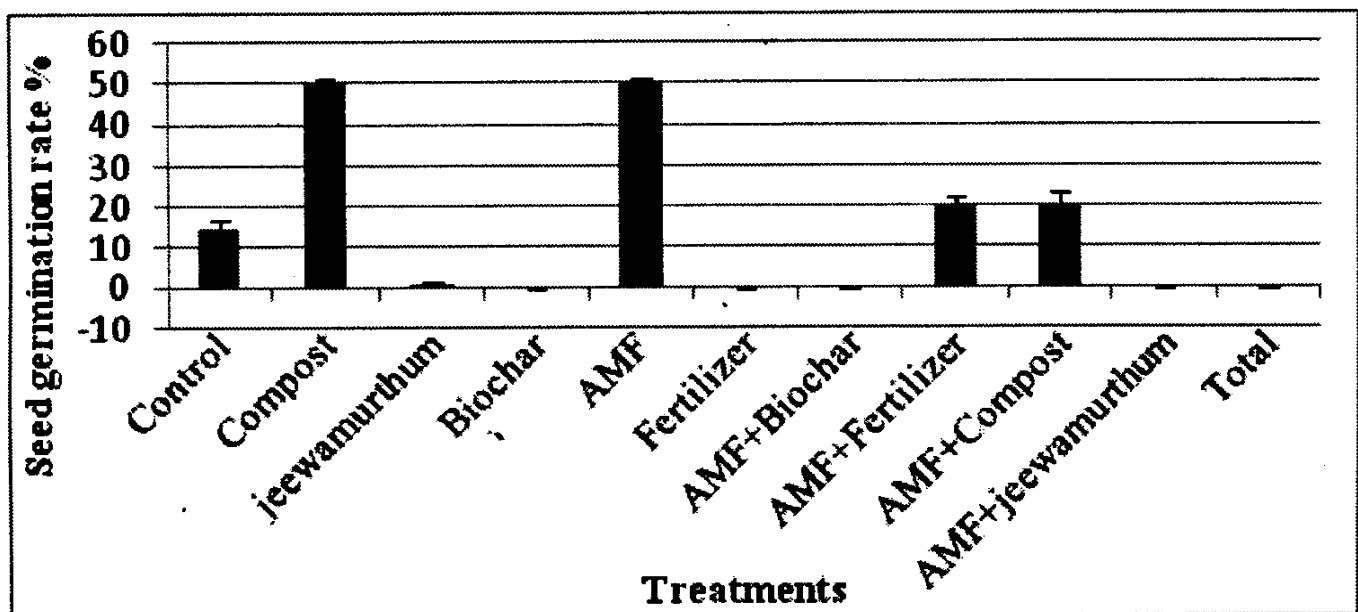
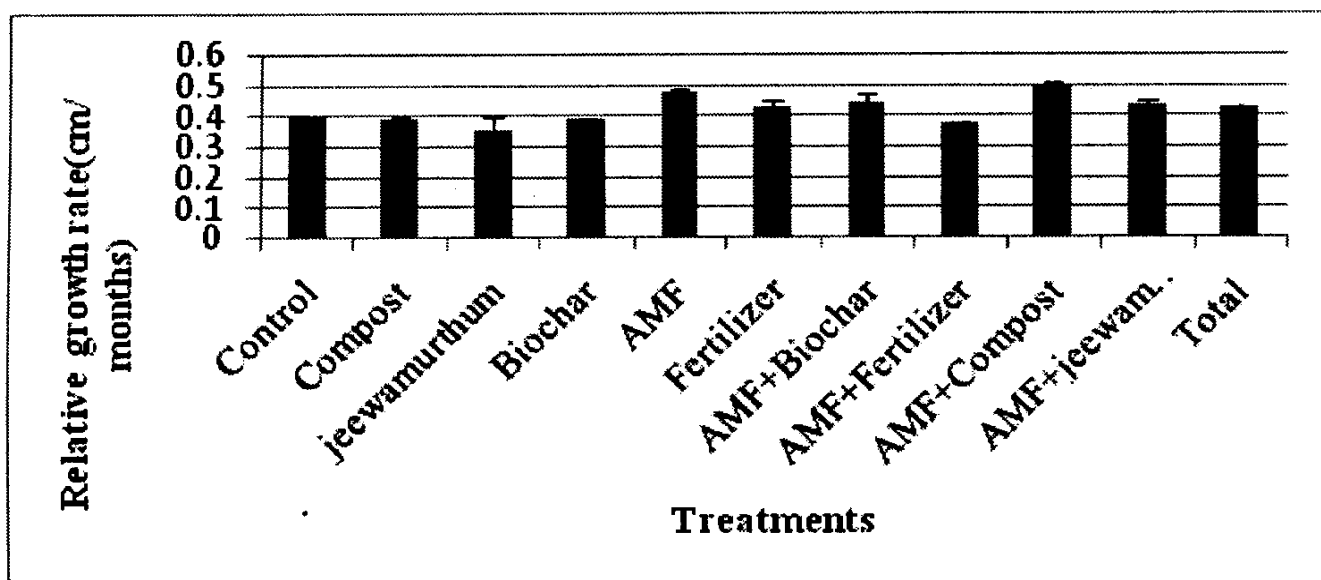


Figure 1: Seed germination percentage of *Manilkara hexandra* after two weeks of sowing



**Figure 2: Change of relative growth rate of *Manilkara hexandra* after four months of growth**

After two weeks from sowing, germination of *Palu* seeds were significantly ( $P < 0.05$ ) high in the treatments of AMF and compost (Figure. 1). Strigolactones are secreted by mycorrhizal host roots in AMF added treatments, which may act as a seed germination stimulant<sup>1</sup>. Addition of the compost may have enhanced microbial growth resulting in higher germination rate<sup>2</sup>. Relative growth rate of *M. hexandra* seedlings were shown significant differences among treatments ( $P = 0.021$ ). *Palu* seedlings of AMF and both AMF and compost treatments showed the highest relative growth rate (Figure. 2). The inoculation of AMF and compost at early stage of seedling development resulted in positive impact on increased *Palu* seedling growth by improving soil physical and biological properties, directly affecting root growth, production of phytohormones by bacteria, enhancement of mineral nutrient uptake with the treatments which included AMF<sup>3</sup>. Considering shoot dry bio mass of *Palu* seedlings, there was no significant difference among treatments ( $P > 0.05$ ). *Palu* seedlings of AMF added treatment showed a significantly higher percentage of AMF colonization ( $P = 0.022$ ).

Inoculation of seeds with compost and/or biofertilizers has beneficial effects on seed germination and seedling establishment of *Palu*. Therefore, those microbial inocula can be used successfully in *Palu* regeneration, in reforestation programs in the dry zone of Sri Lanka.

## REFERENCES

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