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Potential of *Trichoderma* and AMF Mixture with Different Types of Fertiliser for *Durio zibethinus* Murray (Durian) and *Artocarpus heterophyllus* Lam. (Jackfruit) Growth

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ABSTRACT

Over the years, the co-inoculation of *Trichoderma* and arbuscular mycorrhizal fungi (AMF) with different types of fertiliser in a field condition has been understudied. This study explores the potential of *Trichoderma* and AMF mixture (T-AMF) with different types of fertiliser for plant growth with the objectives to: (i) analyse the growth of *Durio zibethinus* and *Artocarpus heterophyllus* fertilised with different types of fertiliser and inoculated with T-AMF and (ii) determine the optimal combination of organic and chemical fertiliser with T-AMF. A randomized complete block design was applied using seven treatments namely, 50 g organic fertiliser (OF) + T-AMF, 100 g OF + T-AMF, 50 g chemical fertiliser (CF) + T-AMF, 100 g CF + T-AMF, 100 g OF, 100 g CF, and control (without fertiliser and T-AMF). The growth analysis of *D. zibethinus* showed the highest mean height was at 100 g OF with T-AMF, stem diameter at 100 g CF with T-AMF, and the number of leaves at 50 g CF with T-AMF. For *A. heterophyllus*, the highest mean height and stem diameter was at 50 g OF with T-AMF and the number of leaves at 100 g OF with T-AMF. The optimal combination of fertiliser with T-AMF for *D. zibethinus*' height was 100 g OF and number of leaves was 50 g CF. The optimal combination of fertiliser with T-AMF for *A. heterophyllus*' height and stem diameter was 50 g OF. The optimal combination for its number of leaves was 100 g OF with T-AMF. This concludes that the application of fertiliser with T-AMF reacted differently to plant species and their growth parameters. The co-inoculation of *Trichoderma* and AMF may present a cheaper and sustainable alternative, especially when the planting scale is huge.

Keywords: Fertiliser, growth, mycorrhizal fungi, sustainable, *Trichoderma*

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INTRODUCTION

Natural soil originally consists of various beneficial mycorrhizal fungi (Barman *et al*., 2016). There are seven known types of mycorrhizae namely, endomycorrhiza, ectomycorrhiza, ectendomycorrhiza, ericoid mycorrhiza, arbutoid mycorrhiza, monotropid mycorrhiza, and orchid mycorrhiza. Among these, endomycorrhiza or also known as arbuscular mycorrhizal fungi (AMF) has gained substantial interest for sustainable crop improvement (Begum *et al*., 2019). AMF are the important endosymbionts in plant yield and ecosystem functioning. Among the AMF genera, *Glomus* was found beneficial in accelerating plant growth (Zhang *et al*., 2018). For example, *Glomus intraradices* was found to be a medium of metal transporters i.e., zinc, copper, and iron between the soil and plant (Berruti *et al*., 2016). The metallic compounds are essential for plant growth and survival especially in extreme conditions (Xie *et al*., 2019).

Trichoderma also have shown big potentials as biofertilisers in reforestation (Karličić *et al.*, 2016). These have been demonstrated in studies by Babu *et al.* (2014), Halifu *et al.* (2019), and dos Santos *et al.* (2020). Major *Trichoderma* strains such as *T. koningiopsis*, *T. asperelloides*, *T. atroviride*, *T. virens*, and *T. parareesei* were found contributing to plant growth (Rubio *et al*., 2014; Haddad *et al*., 2017). The *Trichoderma* three major modes of action i.e., mycoparasitism, antibiosis, and competition play important roles in the plant-soil mechanism, thus influencing the plant growth (Dehariya *et al.*, 2015; Joshi *et al.*, 2016; Duc *et al.*, 2017).