MULCH TYPE EFFECTS ON GROWTH AND PRODUCTION OF FINE ROOTS OF THREE ORNAMENTAL TREE SPECIES

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Introduction

Eighty percent of the tree problems found in urban forests begin in the soil, where most of the tree growth is linked to the performance of the root system (Hamilton, 1979). The adverse rooting environment provided by many urban sites and improper planting methods are among the reasons for this poor survival rate (Funk, 1992). In response to this concern, a modification of planting site was done to imitate the real planting site situation. This was due to the importance of planting hole preparation factor in the transplanting success (Kozlowski and Davies, 1975), where root growth was increased with an increase in planting hole size (Watson et al. 1992). Thus, systematic investigations were currently undertaken to examine the effects of organic mulches on the growth rate and production of fine roots of *Hopea odorata, Cinnamomum iners*, and *Mimosups elengi* tree saplings that were grown under amended soil condition.

Materials and Methods

A 3 x 3 factorial design with 20 replications in a randomised complete block design was set up in early July 1997, which involved three genera (*Hopea odorata, Cinnamomum iners*, and *Mimosups elengi*) and three types of mulching (grass clippings, wood chips, and control). These saplings were planted in black plastic containers, creating a new root ball approximately 0.60 m^3 each and spaced 1 m apart in and between rows. The usage of backfill soil of 1:1 of topsoil and coconut was to ensure well-aerated soil around the root balls. A 10-cm thick layer of organic mulches was also being applied to the soil surface. The rest of the procedures were following the nursery practice standards. The growth rate data (diameter and height), taken at the end of August 1997, was recorded from a permanent mark of 15 cm above the soil line. It was continuously collected for another 18 months at every 2 months intervals. The extraction of fine roots of all saplings within a one-eighth pie section on the north and south sides (for a total of one-quarter of the entire root system) were excavated at 10-cm depth to determine its density and biomass. Then the data were analysed using one-way analyses of variance and a multiple comparison procedure, prior to log transformations.

Results and Discussion

The extraction of tree fine roots has just begun, whilst the data analyses on growth rate are under way. Some interesting results were obtained based on visual observations, such as (i) all 180 transplanted saplings had survived transplanting in the field after 19 months on trials; (ii) *Cinnamomum iners* and *Hopea odorata* tree saplings have a fast growth rate; (iii) tree fine roots were found occurred at 10-cm depth in the upper layer of the soil; (iv) the coconut husk was partially decomposed and formed the 10-cm upper layer of the soil; (v) dense mass of tree fine roots was found occurred beneath the grass clipping mulch; (vi) saplings treated with grass clippings showed some increase in calliper and height; (vii) abundant colonisation of the mulch by an extensive network of white gray fungal mycelia; (viii) certain fauna species, such as larva of rhinoceros beetle (*Oryctes rhinoceros*) and adults of unidentified cockroach species, were found abundantly under the grass clippings. In the above ground, the red ant tree (*Oecophylla smaragdina*) was found colonizing the *Cinnamomum iners* and *Hopea odorata* tree saplings, including the mealybugs (*Scymnus* sp. and *Lecanium* sp) and larva of *Spodoptera* sp that were found heavily infested on the shoots of *Mimosups elengi* saplings; (ix) leaf diseases such as brown lesion, shot hole, brown scald, interveinal brown lesion, brown pinhead spot, and galls were mainly found in *Cinnamomum iners* and *Hopea odorata* tree saplings; and (x) the incidence of weed species such as *Fimbristylis acuminata* indicates that partially decomposed coconut husk contains low soil pH.

References

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