EFFECTS OF POTTING MIXTURES, POTTING SIZES AND GROUND ASPECTS ON GROWTH OF SEVEN INDIGENOUS TREE SPECIES IN FOREST MANAGEMENT UNIT 11, SABAH

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THESIS SUBMITTED IN FULFILLMENT FOR THE DEGREE OF MASTER OF SCIENCE

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ABSTRACT

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ASPECTS ON GROWTH OF SEVEN INDIGENOUS TREE SPECIES
IN FOREST MANAGEMENT UNIT 11, SABAH**

The main objectives of this study were to investigate the effects of potting mixtures, potting sizes and ground aspects on growth of seven indigenous tree species in a degraded forest located in FMU 11. The first two experiments were conducted at the tree nursery while the effects of ground aspects was done in the field. Seven indigenous tree species were chosen for this study; *Parashorea malaanonan*, *Parashorea tomentella*, *Shorea symingtonii*, *Diospyros discocalyx*, *Shorea faguetoides*, *Aquilaria malaccensis* and *Hopea ferruginea*. One of the reasons for choosing these species was to widen the species choices for reforestation purpose. The potting mixture experiment consisted of two treatments – T1 (3 parts forest topsoil, 2 parts rice husk and 1 part sand) and T2 (3 parts forest topsoil, 2 parts sawdust and 1 part sand), and Control (3 parts forest topsoil, 2 parts peat and 1 part sand). Two potting sizes were investigated in the potting size experiment – P1 (15.2 x 22.9 cm) and P2 (17.8 x 30.5 cm) and Control (7.6 x 22.9 cm). Both experiments consisted 30 seedlings per species per treatment. In the field trial, the planting site was divided into five aspects – north, south, east, west and zero. Seedlings were planted in an east-west direction in rows. Height (cm) and diameter (mm) increments in the three experiments were measured and the relative growth rates (RGR) were calculated for three months. Potting mixture T1 and potting size P2 resulted in best seedling growth. Potting mixture T1 and potting size P2 achieved highest growth rates at 0.1376±0.0801 cm (SD) and at 0.1235±0.0766 cm. In the field trial, growth rates of seedlings were found highest in east-facing at 0.1390±0.0606 cm. All three null hypotheses were rejected. Relative growth rates in potting mixture, potting size and ground aspects were significantly different [Potting mixture: ANOVA, RGRH: N=210, F=4.807, p=0.008; RGRD: ANOVA, N=210, F=20.256, p<0.001); potting size: (ANOVA, RGRH: N=210, F=8.000, p<0.001; ANOVA, RGRD: N=210, F=5.041, p=0.007); ground aspects: (ANOVA, RGRH: N=140, F=34.812, p<0.001; RGRD: N=140, F=16.817, p<0.001)]. In potting mixtures, there were interactions in terms of height and diameter between two factors [UNIANOVA, RGRH: F=2.388, R^2=0.745, p=0.005; RGRD: F=3.088, R^2=0.804, p<0.001]. There was no interaction in potting size experiment (UNIANOVA, F=1.500, R^2=0.728, p=0.119). For ground aspects, there was interaction between the factors (UNIANOVA, F=27.795, R^2=0.904, p<0.001). In the potting mixture experiment, T1 was recommended because the inclusion of rice husk promoted best growth associated with highest porosity (68%), available phosphorus and suitable pH range. In consideration of the seedling performance and cost, P1 was recommended. Based on the field trial, it was recommended that seedlings should be planted facing east to attain best growth.

ABSTRAK

Objektif utama kajian ini adalah untuk mengenalpasti kesan sebatian campuran, saiz sebatian serta aspek ke atas tumbesaran anak benih tujuh spesies kayu tempatan di kawasan hutan FMU 11. Kedua-dua eksperimen pertama dijalankan dalam tapak semaian manakala kesan aspek dilaksanakan di lapang. Spesies yang dipilih ialah Parashorea malaanonan, Parashorea tomentella, Shorea symingtonii, Diospyros discocalyx, Shorea faguetoides, Aquilaria malaccensis and Hopea ferruginea. Salah satu sebab spesies tempatan dipilih adalah untuk meluaskan had pilihan spesies. Sebatian campuran mengandungi dua rawatan – T1 (3 bahagian tanah, 2 bahagian kulit padi dan 1 bahagian pasir) dan T2 (3 bahagian tanah, 2 bahagian habuk kayu dan 1 bahagian pasir) serta Kawalan (3 bahagian tanah, 2 bahagian tanah gambut dan 1 bahagian pasir). Dalam eksperimen saiz sebatian terdapat juga dua rawatan – P1 (15.2 x 22.9 cm) dan P2 (17.8 x 30.5 cm) serta Kawalan (7.6 x 22.9 cm). Dalam kedua-dua eksperimen ini, terdapat 30 sampel per spesies per rawatan telah diukur. Untuk kerja lapang, kawasan kajian telah dibahagikan kepada lima aspek yang mengandungi utara, selatan, timur, barat and sifar. Anak benih ditanam dalam barisan timur-barat. Ketinggian (cm) dan diameter (mm) merupakan penentu kadar tumbesaran pokok. Pengambilan data setiap bulan selama tiga bulan telah dilaksanakan. Analisa statistik menunjukkan kadar tumbesaran dalam sebatian camburan T1 dan saiz sebatian P2 mencapai kadar tumbesaran tertinggi secara umum. Dalam sebatian campuran T1, kadar tumbesaran adalah 0.1376±0.0801 cm (SP) manakala P2 mencapai kadar tumbesaran tertinggi, iaitu 0.1235±0.0766 cm. Kedua-dua eksperimen ini mendapat keputusan yang signifikan [Sebatian campuran: ANOVA, RGRH: N=210, F=4.807, p=0.008; RGRD: ANOVA, N=210, F=20.256, $p<0.001$); saiz sebatian: (ANOVA, RGRH: N=210, F=8.000, $p<0.001$; ANOVA, RGRD: N=210, F=5.041, $p=0.007$)Dalam mengenalpasti kesan aspek ke atas tumbesaran di lapang, anak benih yang ditanam di timur mencapai kadar tumbesaran yang terbaik, iaitu 0.1390±0.0606 cm dari aspect timur. Ketiga-tiga hypothesis sifar telah ditolak. Kadar pertumbuhan relative dalam sebatian campuran, saiz sebatian dan aspek berbeza secara signifikan. Kadar tumbesaran dalam sebatian campuran and kesan aspek telah membawa signifikan dalam keputusan [UNIANOVA, sebatian campuran, RGRH: F=2.388, R²=0.745, p=0.005; RGRD: F=3.088, R²=0.804, $p<0.001$; Kesan aspek, F=27.795, R²=0.904, $p<0.001$]. Dalam sebatian campuran dan kesan aspek, interaksi telah berlaku [UNIANOVA, sebatian campuran, RGRH: F=2.388, R²=0.745, p=0.005; RGRD: F=3.088, R²=0.804, $p<0.001$; kesan aspek, RGRH: F=2.388, R²=0.745, $p=0.005$; RGRD: F=3.088, R²=0.804, $p<0.001$]. Sebaliknya, saiz sebatian tidak member sebarang interaksi antara dua faktor [UNIANOVA, F=1.500, R²=0.728, $p=0.119$. Dalam sebatian campuran, T1 adalah dicadangkan kerana ia member kadar tumbesaran terbaik dengan kadar ruangan (68%) dan fosforus tertinggi serta pH yang sesuai. Dalam mempertimbangkan kadar tumbesaran anak benih dan kos dalam eksperimen saiz sebatian, P1 adalah digalakkan. Dalam eksperimen aspek, penanaman anak benih harus dilaksanakan dengan aspek timur.