

Above - ground growth performances of Cinnamon (*Cinnamomum verum* presl) as affected by potting media

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Abstract

An experiment was conducted at the Faculty of Agriculture, University of Ruhuna, Mapalana, during May to September, 2004, to study the above ground - growth performance of Cinnamon as affected by three potting media (gravelly soil, silver sand soil and mixture of top soil: sand: compost 1:1:1 ratio). Seeds were sown in 10 × 15 cm size poly bags and seedlings transferred to large poly bags after 6 months (15 cm × 25 cm) and maintained up to 10 months. The experiment was laid out in a Completely Randomized Design (CRD) with five replicates and each replicate with 8 poly-bagged seedlings. Leaf number, leaf area, leaf dry weight, plant height and above ground biomass were measured at two monthly intervals up to 10 months. Data were statistically analyzed using ANOVA and means were separated using DMRT.

Results did not show a clear trend with regard to the growth parameters up to 8 months of planting. Most of the growth parameters were not significantly affected by potting media at the early stage, but at a later stage, it showed a different trend. There was no significant difference in leaf number up to 8 months period, but significantly higher leaf number was recorded in gravelly soil after 8 months of planting and no significant difference in other media. Although there was no significant difference at the early stage, significantly ($P < 0.05$) higher leaf area was recorded in plants grown in silver sand soil compared to gravelly soil and soil mixture, after 8 months of planting. Significantly higher ($P < 0.05$) leaf dry weight was recorded in plants grown in gravelly soil after 8 months of planting. Plant height was not significantly different among different potting media. No significant difference was recorded in above ground biomass up to 8 months and after that it was significantly higher ($P < 0.05$) in gravelly soil, whereas no significant difference was observed in plants grown in silver sand and soil mixture. Considering all growth parameters, it could be concluded that plants grown in gravelly soils showed better shoot growth performance, followed by those raised in silver sand and soil mixture.

Keywords: Cinnamon, gravelly soil, Southern coastal belt, wet zone, potting mixture

Introduction

Cinnamon (*Cinnamomum verum* presl) belongs to the family Lauracea. It is indigenous to Sri Lanka (Bavappa et al.; 1996). Cinnamon is also cultivated in other countries such as India, Indonesia, Philippines, Burma, Korea, Taiwan, Japan, Vietnam, China, Madagascar and Brazil (Manning, 1970; Purseglove, 1977). Sri Lanka is the largest Cinnamon producer in the world, which contributed 60-70 % of the total world production (Foch-heng, 1965). The extent under Cinnamon cultivation is estimated at approximately 25,300 hectares (Central Bank Report, 2003).

Cinnamon is commonly cultivated in uplands of the low country Wet Zone in Southern part of Sri Lanka. Cinnamon cultivation is presently concentrated along the coastal belt stretching along Negombo to Matara. It has also made inroads to the inlands of Kalutara, Ambalangoda, Matara Galle and Rathnapura.

Cinnamon is predominantly established by seedlings due to lack of proven vegetative propagation technique. This sexual propagation leads to a high degree of variability in existing plantations, particularly in growth, yield and quality characteristics.

From the past experience, it appears that the soil of Sri Lanka is more favorable to the growth of Cinnamon than to any other aromatic plants. The type of soil has a pronounced effect on the quality of the bark. In Sri Lanka, the best Cinnamon is grown around Negombo (Western province) on fine white quartzitic sand (Silver sand). The other main Cinnamon growing area is Galle and Matara Districts of the Southern province, where cinnamon grown on lateritic gravelly soil of the low country wet zone produces more rapid growth but the quality of bark is somewhat thicker and coarser than Negombo (Purseglove, 1981).

Materials and Methods

The experiment was carried out at the Faculty of Agriculture, University of Ruhuna, Mapalana. Seedlings were used for this experiment and fresh seeds of cinnamon were used as planting material to raise seedlings.

The experiment was set up according to Completely Randomize Design (CRD) with three treatments and five replicates. Each replicate had eight plants. Gravelly soil (T_1) and silver sand soil (T_2) from major Cinnamon-growing areas and potting mixture (top soil: sand: compost 1:1:1) (T_3) were treatments for the experiment.

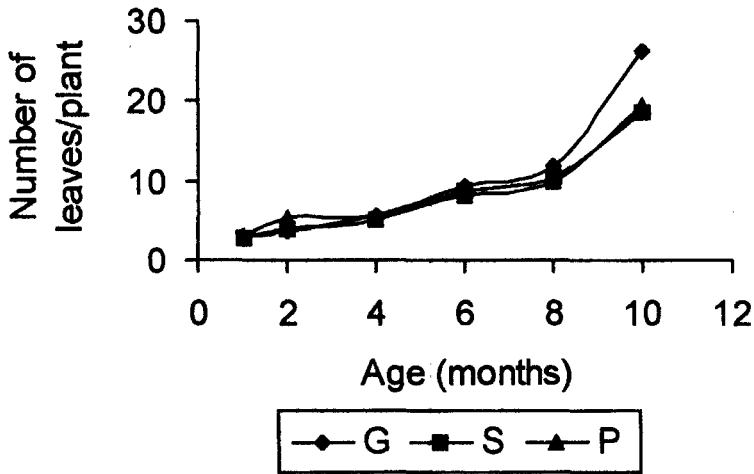
Polythene bags (300 gauge) with 10 cm diameter and 15 cm height, filled with different potting mixtures as assigned to different treatments, were used for the experiment up to 4 months of age and later transplanted into large poly bags, 15 cm × 25 cm size. A few seeds were planted in each poly bag and after germination thinned out, remaining one healthy plant. Large poly bags were used for transplanting six months old Cinnamon seedlings. Plants were maintained without water stress and free of weeds. Mancozeb was applied four times as foliar application to control leaf spot disease.

Leaf number, leaf area, dry weight of leaves, plant height and dry weight of stems were considered for growth measurements. Leaf area was measured using three different methods, (length and breadth method; grid method and disk method). Dry weight of leaves and stems were obtained after oven drying the sample at 60 °C for 5 days.

Analysis of Variance (ANOVA) was carried out in Complete Randomize Design (CRD) for plant growth parameters. Duncan's Multiple Range Test (DMRT) was employed to separate treatment means. Other than ANOVA; graphical presentation was used to present results of the experiments.

Results and Discussion

There was no significant difference in leaf number up to 8 months of age, but significantly higher leaf number was recorded in gravelly soil after 8 months of planting and no significant difference was observed in other potting media (Fig. 1).



G = Gravelly soil S = Silver sand soil P = Potting mixture

Fig. 1: Average leaf number of cinnamon in three different potting media

There was no significant difference in leaf area in the potting media up to 8 month of age. Significantly higher leaf area was recorded in plants grown in silver sand soil followed by gravelly soil and potting mixture, after 8 month of planting (Figs. 2 and 3).

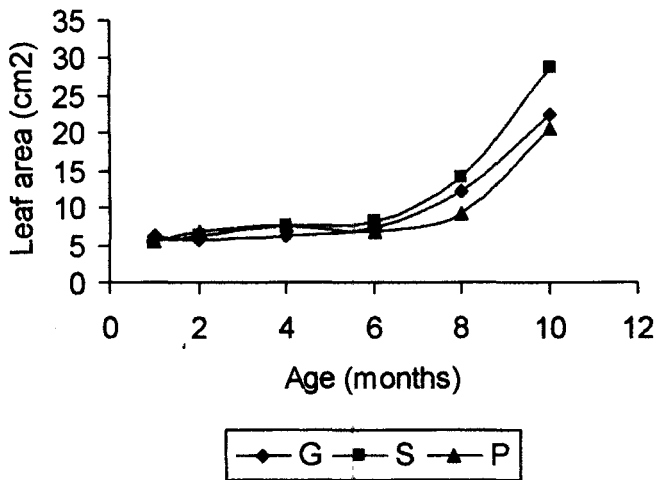


Fig. 2: Average leaf area (cm²) of cinnamon in different potting media (using Grid method)

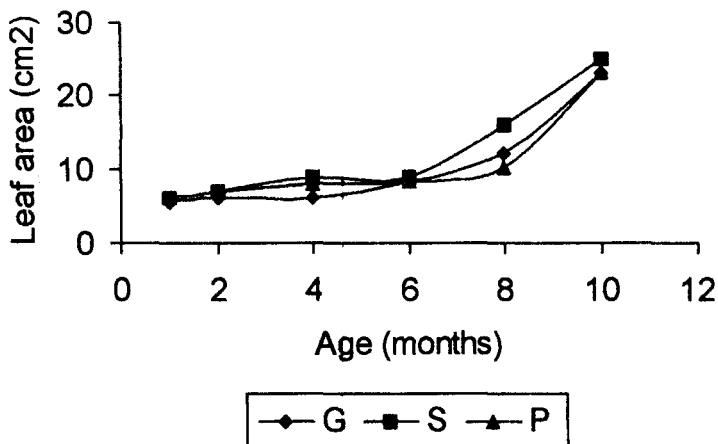


Fig. 3: Average leaf area (cm²) of cinnamon in different potting media (using disk method)

Leaf dry matter was not significantly affected by potting media up to 8 months of age. Significantly higher leaf dry matter was recorded in plants grown in gravelly soil after 8 months of planting, compared with silver sand soil and potting mixture (Fig 4).

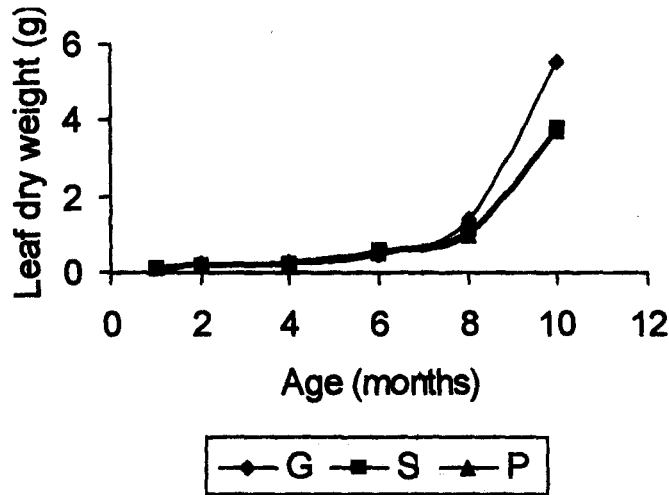


Fig. 4: Average leaf dry weight (g) of Cinnamon in different potting media

There was no significant difference in plant height in the potting media up to 8 months of age. Significantly higher plant height was recorded in plants grown in gravelly soil followed by silver sand soil and potting mixture (Fig 5).

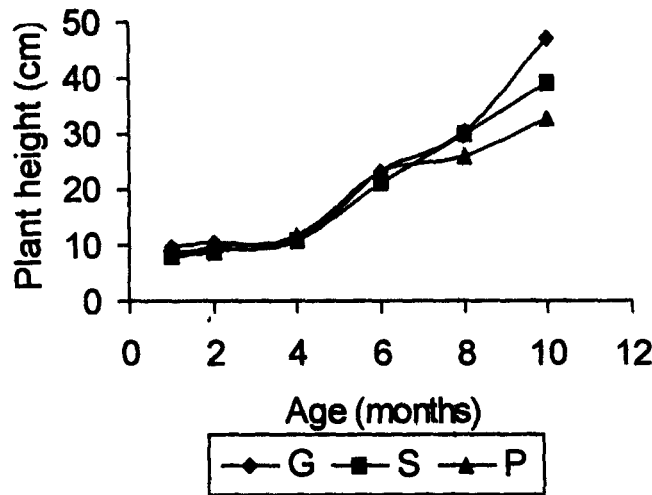


Fig. 5: Average plant height (cm) of Cinnamon in different potting media

There was no significant difference of above ground biomass in the potting media up to 8 months of age. Significantly higher above ground biomass was recorded in plants grown in gravelly soil compared with silver sand soil and potting mixture, after 8 month of planting (Fig 6).

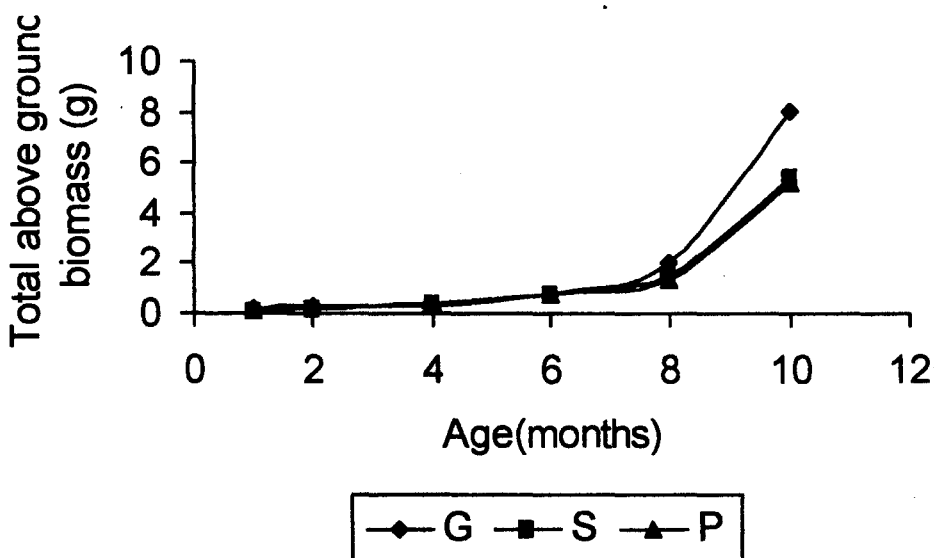


Fig. 6: Total aboveground biomass (g) of Cinnamon in different potting media

Conclusions

Considering the growth parameters (leaf number, leaf area, leaf dry weight, plant height, stem girth and dry weight of stem), plants grown on gravelly soil showed better growth performance, followed by those raised in silver sand and soil mixture, but higher leaf area of Cinnamon was recorded in plants grown in silver sand soil than the other two potting media.

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