

Abstract

Vetiver (*Vetiveria zizanioides*) (Savandara) is one of the most important medicinal and aromatic plants widely used in indigenous medicine and perfumery industry. Even after careful harvesting, 40% of the roots remain in the soil, and yield highly damaged and poorly developed roots. This also reduces the oil yield and results in inferior quality of Vetiver oil. Therefore, it is important to develop suitable management strategies for effective harvesting of Vetiver roots and oil with high quality in commercial Vetiver cultivations.

For this purpose several studies were carried out at the Medicinal Plant Garden, Faculty of Agriculture, University of Ruhuna, Cinnamon Research Institute, Palolpitiya, Matara and at the Industrial Technology Institute (ITI), Colombo during the period January, 2007 to April 2010. Four pot experiments and three field experiments were laid out using Completely Randomized and Randomized Complete Block Designs and two way parallel row designs. Data were collected on root dry weight, shoot dry weight, number of leaves and number of tillers as growth and yield parameters. Oil content and Khusimol, β -Vetivenene, β - Vetivone, α - Vetivone and Iso-valencinol contents which determine the quality of Vetiver were extracted and analyzed using steam distillation procedure and Gas Chromatography Internal normalization method, respectively. Data were analyzed using ANOVA (Analysis of Variance) with Statistical Analysis System at 5% probability level. Different potting mixtures developed significant differences ($P \leq 0.05$) on growth, yield and quality parameters of Vetiver. Top soil: sand (1:2) potting mixture appeared to be the best potting mixture and plant yielded 641 g/plant of root dry weight, 1572.8 g/plant of shoot dry weight, 471 leaves/plant, 67 tillers /plant, 1.8% of oil content at 9 months after planting. Top soil: sand (1:2) potting mixture also recorded Khusimol, β - Vetivenene, β - Vetivone and α - Vetivone contents 16.9%, 1.1%, 4.9% and 6.4%, respectively. Vetiver grown in 45 cm pot height showed higher biomass production compared to other treatments. Vetiver harvested at 9 months after planting showed significantly ($P \leq 0.05$) higher Khusimol (14.5%), β - Vetivone (1.4%), Iso-valencinol (4.9%) and higher oil content (2.13%). Irrigations at every 5 days and application of compost: inorganic fertilizer (3:1) recorded higher root dry weight (1229 g/plant), shoot dry weight (3104 g/plant), number of leaves (1146/plant), tillers (190/plant) and oil content (5.82%) as well as

β – Vetivenene (0.4%), β – Vetivone (3.4%), Khusimol (9.3%), α – Vetivone (5%) and Iso-valencinol (12.3%) contents. Different planting methods significantly ($P \leq 0.05$) influenced biomass yield of Vetiver. Significantly ($P \leq 0.05$) higher root and shoot dry weights, numbers of leaves and tillers as well as oil contents were recorded plant grown in both ridge and furrow system and raised beds when compared to the pit method in both 6 and 9 months after planting. Significant effects were also found among the spacing for all parameters studied. Vetiver planted at 80 cm between row spacing and 60 cm within row spacing showed significantly higher ($P \leq 0.05$) dry weights of shoot (860.63 g/plant) and roots (343.82 g/plant), number of leaves (531/plant), number of tillers (65/plant) and oil content (2.13%) at 9 months after planting. Both the organic and inorganic fertilizer treatments had a greater effect on biomass production of Vetiver. Vetiver treated with compost : inorganic fertilizer (3:1) showed significantly ($P \leq 0.05$) higher root dry weight (241 g/plant), shoot dry weight (592 g/plant), number of tillers (50/plant), number of leaves (394/plant), oil content (3.74%) as well as significantly ($P \leq 0.05$) higher amounts of β – Vetivenene (0.4%), Khusimol (9%), and Iso- valencinol contents (9.2%), averagely higher β – Vetivone (4.9%) and α – Vetivone (4.3%) contents compared to all other treatments.

When Vetiver grown in poly bags, 30 cm width and 45 cm height black polythene and bags, filled with top soil: sand-1:2 potting mixture and application of mixture of compost: inorganic fertilizer (3:1) with irrigation intervals of 5 days and harvesting at 9 months after planting could be used to achieve higher growth, yield and oil quality of Vetiver. When Vetiver plants grown in field, potting mixture of top soil: sand -1:2 media as ridge and furrow system with the space of 80 × 60 cm, application of mixture of compost: inorganic fertilizer (3:1) and harvesting 9 months after planting could be recommended to ensure higher growth, root yield as well as oil yield.