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Performance Evaluation of a Newly Fabricated Steam Distillation Unit on Extracting Essential Oil from *Pogostemon heyneanus* Benth. (Lamiaceae)

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Pogostemon heyneanus Benth. (Lamiaceae) is a large, straggling under shrub commercially grown to extract an essential oil called Patchouli. Because of low technical sophistication and infrastructure requirements, steam distillation has been popularized for extracting essential oil from aromatic plants. The Department of Plantation Management of the Faculty of Agriculture and Plantation Management of Wayamba University of Sri Lanka has developed a prototype steam distillation unit for extracting essential oil from *P. heyneanus*. The study was conducted to evaluate the steam distillation unit performance under three different particle sizes of dried herbage of *P. heyneanus*. The three treatments of the study were particles less than 5 mm (T1), in between 5 and 10 mm (T2) and larger than 10 mm (T3). The distillation unit was fully loaded with each particle size of dried leaves of *P. heyneanus* prior to the distillation. The oil recovery was measured at 10 minute intervals, until the total recovery reached an equilibrium. The pressure and temperature were maintained constant at $0.50 \pm 0.07 \text{ kg/cm}^2$ and $100 \pm 5^\circ\text{C}$, respectively. The total leaf used in T1, T2 and T3 were respectively 3038, 2300 and 2070 g. The respective packing densities of T1, T2, and T3 were 0.08, 0.06 and 0.05 gcm^{-3} . The final oil recovery of T1, T2, and T3 were respectively 34, 22, and 26.7 ml. The respective total effective distillation periods for T1, T2, and T3 were 120, 120 and 140 minutes. T1, T2, and T3 were able to recover respectively 85.3, 73.6 and 72.7 % of oil from the total recovery during the first hour of the distillation and also respectively 14.7, 26.4 and 27.3 % of oil from that of the total during the final 100 minutes of the distillation. The highest extraction efficiency was found in T3 (86%) while that of the lowest was found in T2 (63.8%). The reduced formation of free channels at the lowest packing density in T3 increased the leaf stem interface and recorded the highest oil extraction. Among the selected particle sizes, the best performance of the steam distillation unit in terms of oil recovery of *P. heyneanus* was found with the particles smaller than 5 mm. However, based on the extraction efficiency of the distillation process, the particles larger than 10 mm could be partially recommended as the best.

Keywords: *Pogostemon heyneanus*, Steam distillation, Particle.

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