

Effect of Different Drying Temperatures on Oil Yield, Antioxidant Capacity and Bioactive Compounds of *Pogostemon heyneanus* Benth. (Lamiaceae)

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Abstract

Pogostemon heyneanus Benth. is an industrially important aromatic medicinal plant belonging to the family Lamiaceae and commercially cultivated for distillation of essential oil which is known as "Patchouli oil. Patchouli oil is an important raw material of an array of commercial products. Drying process of patchouli herbage directly determine the quality and quantity of patchouli oil.

Therefore, the present study was undertaken to investigate the effect of different drying temperatures on oil yield, antioxidant capacity and bioactive compounds of *P. heyneanus*.

Freshly harvested *P. heyneanus* leaves were dried at, 40, 45, 50, 55 and 60 °C in an oven and room temperature at 32±2 °C. The volatile oil was distilled using a cleverger arm apparatus. Total Antioxidant Capacity (TAC), Total Phenolic Contents (TPC) and Total Flavonoid Contents (TFC) were determined by using Ferric Reducing Antioxidant Power (FRAP) assay, modified Folin-Ciocalteu colorimetric methods and the method described by Liu *et al.*, (2002) respectively.

The oil content was increased with the temperature ranging from 1,95 - 2,5%. Up to 55 °C oil content was increased with the temperature and then decreased with the increased temperatures. The optimum temperature which resulted higher oil content was 55 °C (2.5%±0.14) . The highest oil content was found at 55 °C (2.5%±0.14) and followed by drying temperatures of 50 °C (2.41%±0.09), 45 °C (2.13%±0.04), 60 °C (2.06%), 40 °C (2.01%±0.09) and under the room temperature (1.95%±0.07). The highest leaf oil content at 55 °C was not significantly different with the leaves dried at 45 °C and 50 °C.

As demonstrated in table 1, the highest TAC was recorded in leaves dried at ambient air, 32±2 °C (52.77±4.69 mg TE/g DW). This was followed by leaves dried at 40, 45, 50, 55 and 60 °C. TAC of room temperature was significantly different from all other treatments.

Table: Essential oil contents, total antioxidant capacity (TAC), total flavonoid content (TFC) and total phenolic content (TPC) of *P. heyneanus* leaves dried under different temperatures

Temperature °C	Leaf Oil Content %	Leaf TAC (mg TE/g DW)	Leaf TPC (mg GAE/g DW)	Leaf TFC (mg RE/g DW)
Room Temp.(32±2)	1.95±0.07c	52.77±4.69a	15.88±0.22a	99.66±3.10a
40	2.02±0.09bc	43.39±3.26b	13.25±0.16b	82.81±0.54b
45	2.13±0.04bac	40.44±1.20b	12.86±0.12c	76.81±3.99b
50	2.41±0.16ba	30.73±0.60c	12.64±0.06c	52.28±1.71c
55	2.50±0.14a	27.74±0.43c	12.14±0.03d	32.38±1.29d
60	2.06±0.08bc	14.76±1.67d	9.57±0.08e	23.76±1.93e

Means with the same letters in a column are not significantly different at 0.05 level; TE - Trolox Equivalents; GAE - Galic Acid Equivalents; RE - Rutin Equivalents; DW - Dry Weight.

The results clearly indicated a decrease in TAC with increasing temperature. The TPC was decreased with the temperature ranging from 15.88 to 9.57 RE/g DW. The highest TPC (15.88 mg GAE/g DW) was observed in leaves dried at room temperature. This was followed by 40, 45, 50, 55 and 60 °C where the lowest (9.54 mg GAE/g DW) was observed. The highest TPC at 32±2°C was significantly different from all. The TPC at 45 and 50°C were not significantly different. The TFC was decreased with the temperature ranging from 99.66 to 23.76 mg RE/g DW. The highest TFC was found under leaves dried at room temperature, 32±2°C (99.66 mg RE/g DW). This was followed by 40, 45, 50, 55 and 60 °C where the lowest TFC (23.76 mg RE/g DW) was observed. The highest TFC at 32±2°C was significantly different from all. The TFC at 40, 45°C were not significantly different.

Among the selected drying temperatures, it was found that 55 °C would be ideal for drying, with an oil recovery of 2.5%. However when it is compared to drying at room temperature, there were considerable losses in bioactive compounds (TPC, and TFC) and antioxidant activity. Since there is no significant difference between oil contents at 45, 50 and 55 °C, 45 °C could be recommended as the best as it was able to conserve more bioactive compounds and antioxidants than the higher temperature levels studied.

Keywords: Antioxidant capacity; Drying temperatures; Flavonids; Oil content; Phenolics; *Pogostemon heyneanus*

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