Published by :
http://www.ijert.org

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 5 Issue 03, March-2016

Study on the Effect of Moisture Content of Patchouli (Pogostemon cablin) Plants on Recovery Percentage of Essential Oil

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Abstract: **Patchouli (*Pogostemon cablin*) is fragrant herb produce essential oil, known as patchouli oil having high economic importance. Patchouli oil extraction is still new but has large market demand due to therapeutic and healing properties of oil, however, cost-effective route for its extraction is yet to be developed. Due to large gap between demand and supply, it is important to focus on the post harvest processing particularly on the extraction of its oil. Extraction of patchouli essential oil was done using Clevenger apparatus. Drying of herbage before extraction was done in oven at 50ºC. Recovery of patchouli oil at different moisture content *viz* 30, 25, 20, 15 and 10% (wb) were 1.46, 1.49, 1.74, 1.95 and 1.89%, respectively. The highest recovery of oil was obtained at 15% of moisture content which gives oil to the tune of 1.95% when compared with the other samples. The patchouli oil samples extracted during the study were also analyzed for its physico-chemical quality. All the extracted oil samples have shown the values of physico-chemical parametre in the satndard permissible range of patchouli oil.**

Kewwords- Patchouli; essential oil; Recovery, Oven drying, Clevenger apparatus.

INTRODUCTION

Essential oil is a concentrated liquid that contains various elements such as aromatic compounds, organic constituents, including hormones, vitamin and other natural elements [10]. Presently alot of plants have been identified which produce essential oil. One of these plants is patchouli (*Pogostemon cablin*). It belongs to lamiaceae family [2]. Commercial cultivation of the crop in India was first attempted by Tata Oil Mills in 1942. After initial stray attempts to grow the crop, its systematic cultivation started in 1962 by CIMAP. It is slowly spreading in the states of Karnataka, Gujarat, Assam, Andhra Pradesh, Kerala, Goa, Maharashtra, Madhya Pradesh and Orissa and is now becoming popular in Chhattisgarh [7]. The oil of patchouli is known to possess antifungal, antibacterial properties and is used in skin infections, dandruff and eczema, used as an ingredient in insect repellant preparations. The oil is also used in aromatherapy for its antidepressant, anti-inflammatory, cytophylactic and deodorant properties. It is also used in a wide range of toilet soaps, scents, lotions, pre-shave and after-shave lotions and detergents. Its strong tenacity renders it to be particularly suitable for heavy perfumes and for imparting a lasting character and strength to lighter perfumes [5,10].

There is a large gap between demand and supply of patchouli essential oil all over the world along with India as evident from the above data; therefore, it is urgent need to develop proper post-harvest practices for patchouli, so as to avoid post-harvest loss and to improve the oil recovery. The quantity of extracted oil can be increased with the introduction of better post harvest management practices and improvement of processing technology. This will also enhance the wider range of application in various places.

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MATERIALS AND METHODS

Materials:

The plant material was collected from herbal garden, IGKV, Raipur (C.G.) and had average moisture content in the range of 86 - 89% (wb). Whole patchouli plant (Leaves + Stems) was used for recovery of essential oil.

Drying:

For maintaining different levels of moisture (30, 25, 20, 15 and 10%) in patchouli herb oven drying was done at 50ºC [2].

The percentage moisture content was estimated by the following expression.

$$\text{Percentage moisture content (wb)} = \frac{W - w}{W} \times 100 \quad (1)$$

Where,

W = Initial weight of sample, g; and

w = Final weight of sample after drying, g

Oil extraction

Extraction of patchouli essential oil was done using Clevenger apparatus. Firstly recovery of oil was recorded at constant temperature (100ºC) and time (5 h). The process is continued up to 5 hours, at the end of 5 hours oil recovery was recorded in g (w/w). For each sample the oil extraction process was done three times and average value was taken.

Separation and dehydration

Oil separation and dehydration was done using chloroform, separating funnel and anhydrous sodium sulfate.

Fig.1 Patchouli plant, Oven drying and Oil extraction (Clevenger apparatus)

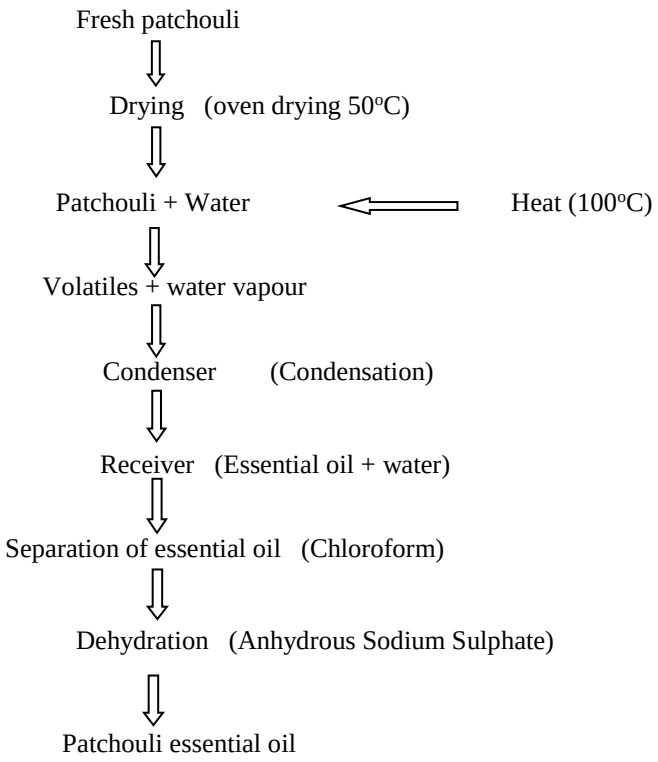

Fig. 2 Flow diagram of patchouli oil extraction process

International Journal of Engineering Research & Technology (IJERT)
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Quality analysis

For physico-chemical quality analysis density, refractive index, acid value and ester value are calculated using standard methods [1].

RESULTS AND DISCUSSION

Recovery of patchouli oil at various moisture contents

Recovery of patchouli essential oil at various moisture percentage was recorded. The sample of 150 g dried patchouli was taken for the extraction of patchouli essential oil, were time and temperature was keeping constant at entire duration of oil extraction process. The oil recovery obtained after completion of distillation process from samples having different moisture percentage viz. 30, 25, 20, 15 and 10% were 1.46, 1.49, 1.74, 1.95 and 1.89 % respectively. At 15% moisture content recovery of patchouli oil was highest (1.95%) as compared with the other samples. From the Fig. 3 it was observed that when the moisture content of patchouli sample decreases, the recovery of patchouli oil increases and vice versa. It was also depicted that oil recovery increases proportionally up to the moisture content of 15% only; further drying of sample towards less moisture content (10%) did not increase the oil recovery. It is inferred from the data that drying up to 15% moisture content is sufficient for extraction of essential oil.

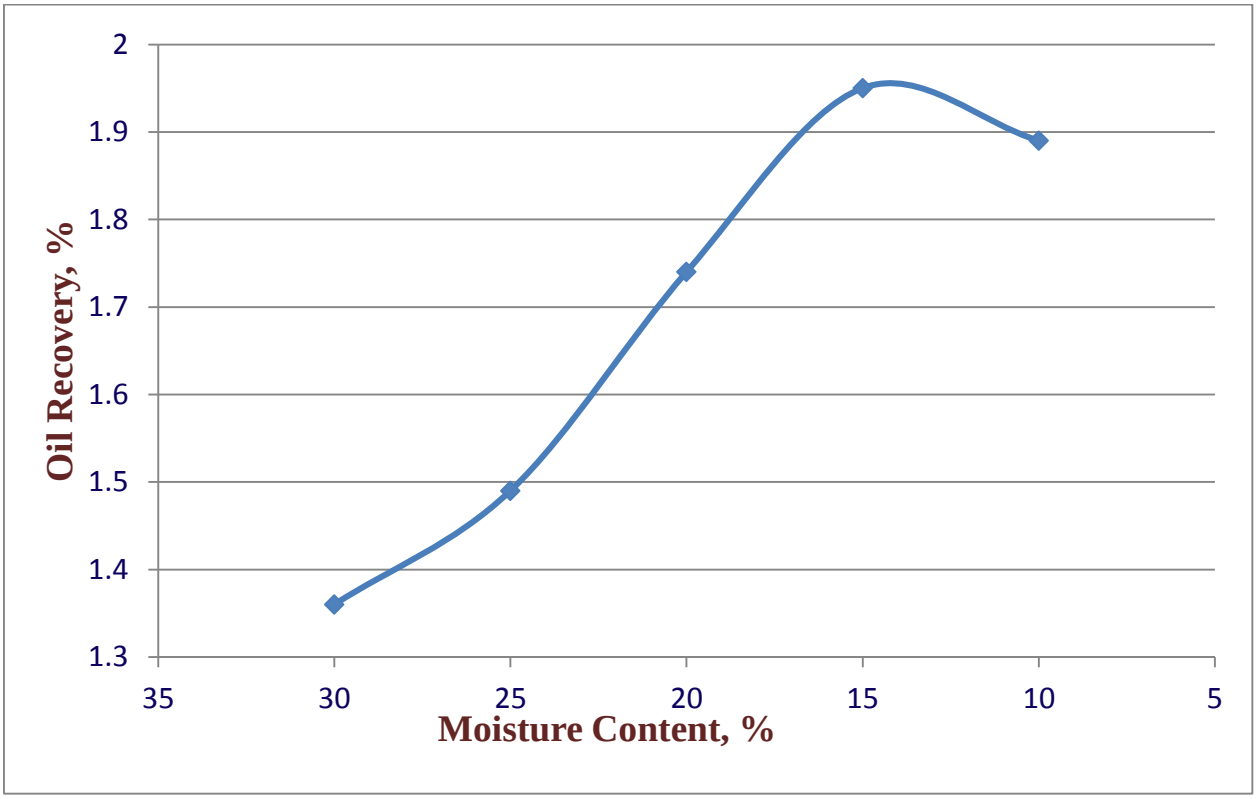

Fig. 3 Oil recovery at different moisture contents

Physico-chemical quality of patchouli oil

The patchouli oils extracted at various moisture contents were analyzed for density, refractive index, acid value and ester value. The Fig. 4 shows the physico-chemical quality of patchouli oil extracted at different moisture contents. Fig. 4 indicates the slight increase in density and decrease in refractive index, acid value and ester value as moisture content of patchouli sample decreases. It was observed that the density of patchouli oil increases from 0.953 to 0.98 g/ml. Refractive index of different extracts decreases from 1.5127 to 1.5095. Acid value and Ester value of different extracts decreases gradually from 3.37 to 1.68 and from 7.3 to 5.05.

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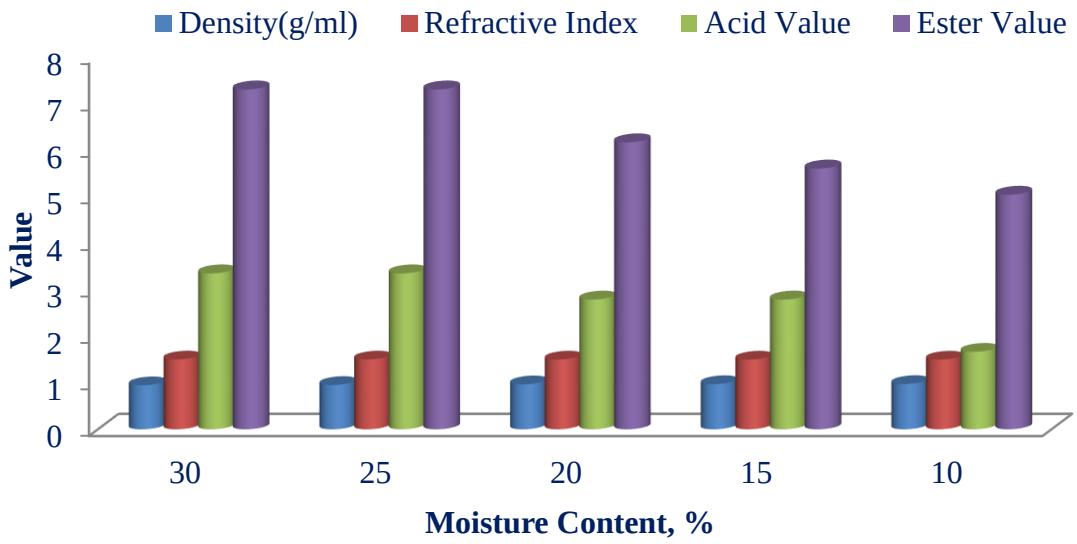

Fig. 4 Physico-chemical quality of patchouli oil extracted at different moisture contents

CONCLUSION

1. Drying up to 15%moisture content is sufficient for extraction of essential oil because at this moisture content of herbage, optimum recovery of patchouli oil was obtained.
2. All the extracted oil samples have shown the values of physico-chemical parametre in the satndard permissible range of patchouli oil.

REFERENCES

[1] Clara, R. A.,Marigliano, A. C. G. and Solimo, H. N. (2010).Physicochemical properties and vapor liquid equilibrium data for steam-distilled lemon essential oil. *Latin American Applied Research*.40:61-66.

[2] Kongkathip, N.,Samang, P.,Kongkathip, B.,Pankaew, Y.,Tanasombat, M. and Udomkusonsri, P. (2009). Development of patchouli extraction with quality control and isolation of active compounds with antibacterial activity.*Kasetsart J. (Nat. Sci.)*43: 519-525.

[3] Krishna, R. and Velankar, H. (2011).Process for increased patchulol content in essential oil of *Pogostemoncablin*.United States Patent, Patent No. : US 7,879,584 B2.

[4] Mustakim, M. K. B. (2008). Patchouli oil extraction by using hydro distillation (lab scale).B. E (Chemical Engineering) unpublished thesis, Faculty of Chemical & Natural Resources Engineering, University Malaysia Pahang. pp. 8-20.

[5] Nasharudin, M. N. B. (2008). Patchoili oil extraction using ultrasonic extraction method.B. E (Chemical Engineering) unpublished thesis, Faculty of Chemical & Natural Resources Engineering, University Malaysia Pahang. pp. 15-19.

[6] Nasruddin.,Gatot, P. and Basuni, H. (2005). Study on distilation process of patchouli oil through leaves delignification. *J. Teknologi Dan IndustriPangan*. 16(3): 243-247.

[7] Raghu, C. (2006). Economics of production and marketing of patchouli in north Karnataka.M. Sc. (Ag.) unpublished thesis, University of Agricultural Sciences, Dharwad. pp. 3-5.

[8] Sandhyavali, M. S.,Sundari, P. S. and Bhavikatti, P. (2011). Isolation and chemical characterization of essential oil of *Saussureasimpsoniana. J. of Pharmaceutical Sciences*.1(3): 239-242.

[9] Sarma, A. and Sarma, T. C. (2003).Patchouli oil recovery and effect of leaf ageing.*J. of Indian Perfumer*.47(2): 151-154.

[10] Shukor, M. Z. B. (2008). Extraction of essential oils from patchouli leaves using ultrasonic assisted solvent extraction method. B.E (Chemical Engineering) unpublished thesis, Faculty of Chemical & Natural Resources Engineering, University Malaysia Pahang. pp. 1-13.