



# Extraction of Essential Oil from a Leaf of *Piper betle* L. (Paan) by Hydro-distillation Method

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## Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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## ABSTRACT

*Piper betle* leaf commonly known to be a Paan in India is eaten raw and sometimes with a mixture of areca nut. The leaf is consumed usually after a lunch or dinner. Traditionally the leaf is well known for a health benefits and also chewed as a mouth freshener. A wide range of researches on a *Piper betle* leaf suggest excellent nutritional benefits on the health. The edible leaf is also known for its specialized essential contents.

The current research attempt is carried out to extract the essential oil from the leaf of *Piper betle* L. by a Hydro distillation method (Clevenger method). The research successfully concludes the extraction of oil with its efficacy towards the percentage of oil achieved during an extraction process.

**Keywords:** *Piper betle* L.; Essential oil; hydro-distillation.

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## 1. INTRODUCTION

*Piper betle L.* of a family Piperaceae, is commonly called as Paan. The plant is well known for its edible leaf. Traditionally the leaf is eaten consumed raw and also by processing through drying methodology. The plant is grown in the Asian continent in various nations on a large scale and found in ample amount which is commercialized on a large scale throughout the different nations. Herbs are known for their essence worldwide [1] in their essential oil content.

Essential oil one of the important commercial product which is used widely on a large scale in a food processing and also for the medicinal purpose. Many bioactive compound that shows various therapeutic effects [2] can be effectively sightseen by a thorough research and development. The *Piper betle* leaf having a special characteristic aroma extends the efficiency for the presence of the essential oil components in this plant. The essential oil contains various anti-microbial, anti-bacterial properties. Hence, the effective use of the oil becomes of prior importance to carry out researches in depth [3,4].

The current research is competed to extract essential oil from the leaf of the *Piper betle L.* by a hydro-distillation method. This is one of the traditional method where a water is used for extracting oil molecules from the plant leaf. The volatile components from the cells of the plant leaf is released due to the stress of heat along with the vapors of the boiled water which is condensed and collected after a separation of oil molecules through a separator in an air-tight container [5-7]. This is one of a widely used methodology by a fragrance industry on a large scale. The research study completed provides successful extraction of essential oil. The experiment provides better results obtained in terms of % yield volume of essential oil.

## 2. MATERIALS AND METHODS

The *Piper betle L.* fresh leaves of 1 kg were bought from the market. The leaves were washed and sliced into a small piece. A 1/4<sup>th</sup> region of the glass vessel was filled with distilled water along-with a tightly packed chopped leaves for the process of hydro-distillation. The process was run for 4 hours and the collected oil was measured and used for further analysis.

The process of extracting oil was completed in three times (three cycles) for each 1kg of raw stock plant leaves labelled as PB1, PB2, PB3; in-order to observeminimum and maximum % proportion of oil from the leaves. The Essential oil molecules extracted were 'ambered colour'.

## 3. RESULTS AND DISCUSSION

The yield obtained is followed; based on the reference of yield followed by Suryawanshi MA, Mane VB et.al. [8] further calculated the % oil obtained.

$$\text{The yield obtained} = \frac{\text{Amount of essential oil (gm) obtained}}{\text{Amount of raw material used (gm)}}$$

The oil extracted is presented in Table 1 and represented graphically in Fig. 1 While Yield of Oil that can be obtained from a raw material used is given in Table 2 and graphically mentioned in Fig. 2. All values are expressed in terms of % yield achieved from an acquired volume.

The graphical representation of extracted oil from Fig. 1 explores the minimum amount of 0.49% in the first cycle and highest of about 0.85% in the 2<sup>nd</sup> cycle of new raw stock of 1kg of a *Piper betle L.* leaves. The mean % proportion of oil extracted from the *Piper betle* leaf was observed to be 0.67% for 1kg the plant leaves.

**Table 1. Oil extraction**

Sr. No.	Extraction of Oil	% oil volume from 1000gm
1	PB1	0.49
2	PB2	0.85
3	PB3	0.67

**Table 2. While Yield of Oil that can be obtained from a raw material**

Sr. No.	Extraction of Oil	Approximate % yield in volume from 1000kg (1 ton)
1	PB1	490
2	PB2	850
3	PB3	670

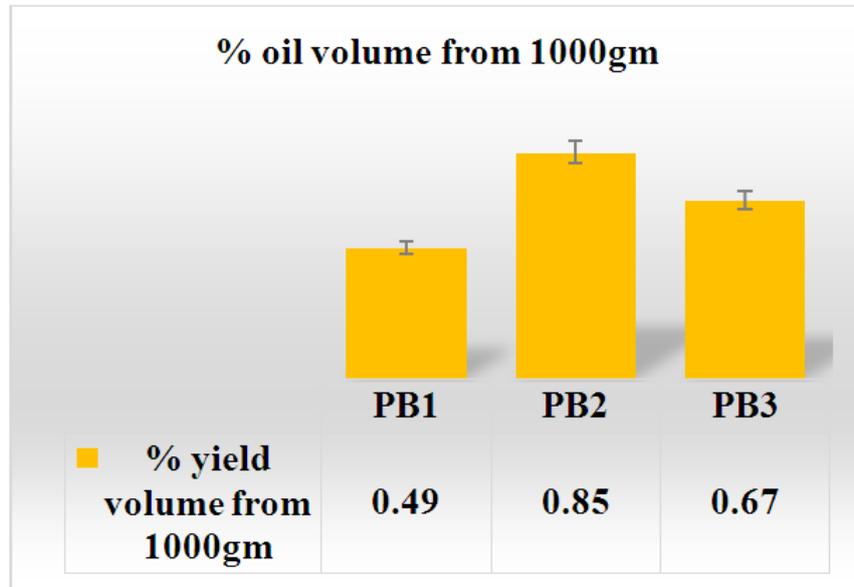


Fig. 1. Bar graph showing Oil extraction method

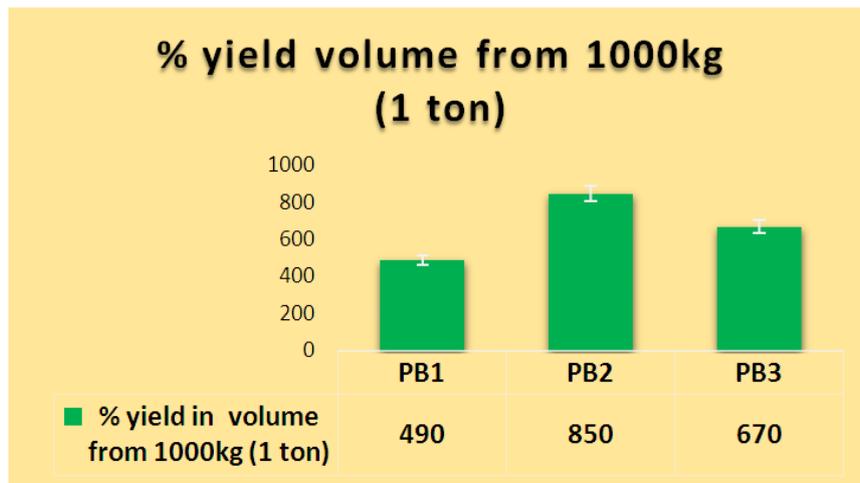


Fig. 2. Bar graph showing While Yield of Oil that can be obtained from a raw material

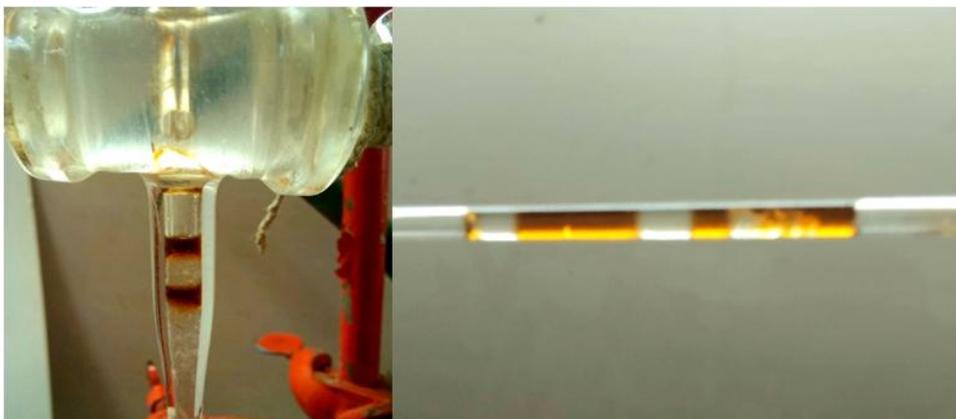


Image 1. Photoplates

#### 4. CONCLUSION

The hydro-distillation method of extraction of oil from the leaves resulted a suitable % volume of Essential oil ranging between 0.50 – 0.90%. Based upon achieved % value; the commercialization of *Piper betle L.* leaf oil forms an effective application for the use of it in the industry of food and cosmetics. Since an edible leaf the essential components determined can be helpful in the further research if explored in preservation methodology of food products. At present an approximate cost of market value for a 30gram *Piper betle L.* essential oil cost around 10-12 US dollar (year 2022). Hence, this provides an efficient opportunity for one to enter into a business and marketing along with use of its applications on a vast scale for generating the economy of one own-self. The experimental extraction successfully descends an extraction of oil from the *Piper betle L.* leaf.

#### CONSENT AND ETHICAL APPROVAL

It is not applicable.

#### COMPETING INTERESTS

Author has declared that no competing interests exist.

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