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A Comparative Report on the Percentage Yield of Volatile Oil from Citrus Fruits by Hydrodistillation

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ABSTRACT

Citrus fruits are known to provide volatile oil from their peel. The standard procedure for extraction is known as eculle by which the peel is twisted clockwise or anticlockwise by the aid of forceps. In the present study, the eculle method has replaced by hydrodistillation of coarsely powdered citrus peel. Three varieties like *Citrus lemonis* (CLE), *Citrus sinensis* (CSE) and *Citrus aurantium* (CAE) of citrus and orange were used. Hydrodistillation of peels were done by taking 30 g coarsely powdered peel in 500 mL flask. Clevenger apparatus for volatile oils lighter than water was used for the experiment. Extraction was continued for 3 h. The amount of volatile was obtained as 0.9 mL for CLE, 1.3 mL for CSE and 2 mL for CAE which represent to 3, 4.3 and 6.6% for CLE, CSE and CAE, respectively. From the percentage yield it become clear that on hydrodistillation of CLE, CSE and CAE, CAE provided more amount of volatile oil which further denotes CAE as better source of volatile oil than other two varieties.

Key words: Citrus fruits, hydrodistillation, volatile oil

INTRODUCTION

Essential oils are most widely used in modern product. Essential oils are used to fragrance bathing products incense, perfumes and cosmetics. The term of alternative medicine, essential oils are most frequently used today in aromatherapy.

Aromatherapy is frequently used to uplift mood and relieve stress. In some countries, the antiseptic, antifungal and antibacterial properties of plant extracts are more widely recognized.

Most citrus peel oils are extracted mechanically or by cold pressed. Expression method of citrus oil extraction is the most accepted one. In the present study, hydrodistillation of dried citrus peels have been tried.

How essential oils do works? (Hemraj *et al.*, 2012):

- Converts smell
- Aroma enters nose
- Connects with cilia
- Reaches olfactory bulb
- Connected to brain
- Impulse reach the limbic system to electrical impulse

Essential oils from number of plants have been reported to possess different pharmacological activities like antimicrobial in *Melaleuca alternifolia* (Cox *et al.*, 2000) and *Woodfordia fruticosa*, antibacterial activity of essential oils and their major constituents against respiratory tract pathogens by gaseous contact (Patwardhan *et al.*, 2010; Inouye *et al.*, 2001) in acute otitis as an expectorants, in chronic bronchitis, analgesic activity (Boyd and Sheppard, 1970; Shubina *et al.*, 1990; D'Amour and Smith, 1941), anti-inflammatory activity, in the treatment of post operative nausea and vomiting (Ocete *et al.*, 1989; Tung *et al.*, 2008) essential oils from *Zingiber officinale*, in case of arthritis. Essential oils from the leaves of *Woodfordia fruticosa* was identified as sesquiterpenoids (β -caryophyllene, γ -curcumen, germacrene-D, β -selinene, elemol) and monoterpenoids (a-pinene, 2, 6 dimethyl-1, 3, 5, 7 octatetraene) (Kaur and Kaur, 2010).

MATERIALS AND METHODS

Fresh fruits of *Citrus lemonis* (CLE), *Citrus sinensis* (CSE) and *Citrus aurantium* (CAE) were purchased from local market. The peels of fruits were removed and dried in shade. The dried peels were then coarsely powdered and stored for further study.

Procedure (Hemraj *et al.*, 2012): The amount 30 g powder CLE, CSE and CAE were taken in 500 mL capacity volumetric flask. Three assemblies of clevenger apparatus for the extraction of volatile oil lighter than water were adjusted carefully and the extraction was done for 3 h. The oil so obtained was measured for each assembly and the percentage yield was calculated.

RESULTS

Percentage yields were obtained for CLE, CSE and CAE about 6.6% v/w of volatile oil was obtained from CAE, whereas 4.3% v/w from CSE and 3% v/w from CLE. The amount of volatile oil so obtained was compared (Table 1 and Fig. 1).

Table 1: Percentage yield of volatile oil from dried citrus peel of *Citrus lemonis* (CLE), *Citrus sinensis* (CSE) and *Citrus aurantium* (CAE) by hydrodistillation

Name	Amount taken (g)	Amount obtained (mL)	Percentage yield
CAE	30	2.0	6.67
CLE	30	0.9	3.00
CSE	30	1.3	4.33

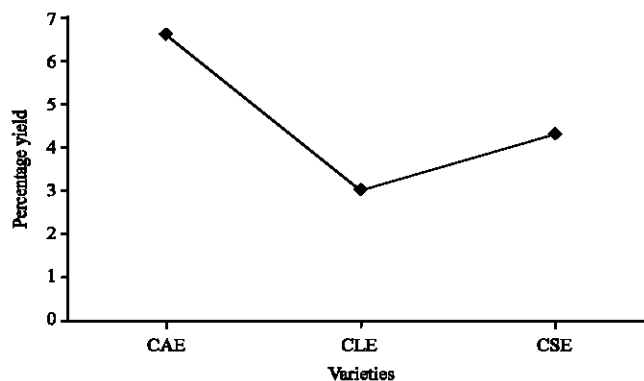


Fig. 1: Comparative percentage yield of volatile oil by hydrodistillation from three citrus fruit peel

DISCUSSION

Although the volatile oils from number of plants have been already reported like for Cinnamon bark and *Woodfordia fruticosa* and *Stephania glabra* (Hemraj *et al.*, 2012). The volatile oils from citrus fruits has been already reported (Vashist and Sharma, 2013). Similarly the hydrodistillation method instead of standard eculle method was used for then extraction of volatile oil from orange peel powder. From the 30 g of orange peel about 1ml amount of volatile oil was obtained which represented to 3.33% v/w.

Similarly, in the present study, three different varieties viz., CLE, CSE and CAE of citrus fruits, were selected. Hydrodistillation was continued for 3 h. From the CAE 6.66% v/w (Table 1) of volatile oil was calculated after 3 h. The least amount of volatile oil 3% v/w was reported. Whereas, 4.33% v/w was obtained. The comparison percentage yield for a citrate between the all three varieties was studied. *Citrus aurantium* (CAE) was found to be the richer source of volatile oils than other two (*Citrus lemonis* and *Citrus sinensis*) varieties.

CONCLUSION

The plants *Citrus lemonis*, *Citrus sinensis* and *Citrus aurantium* taken up for the comparative study of the percent yield of their volatile oil by hydrodistillation. The present investigations may help the researchers to evaluate and to find out new properties on the volatile oil obtained by hydrodistillation instead of eculle method.

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