



Evaluation of essential oil components from the fruit peelings of two commercially important varieties Dusehri and Chaunsa mango (*Mangifera indica* L.), found in Mirpurkhas Sindh Pakistan

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Abstract: The significant oil constituents obtained from the natural fruit peelings of the two economically imperative types of mango (*Mangifera indica* L.) were analyzed with the aid of GC-MS. For this investigation GC-MS was utilized for the portrayal of the separated essential oil. Two Mango varieties to be specific, Dusehri and Chaunsa were chosen from Mirpurkhas locale. Fundamental essential oil was acquired from mango peelings by hydro refining strategy. The aggregate 19 essential oil segments extending between 0.68-19.67% recognized from the Dusehri and Chaunsa mango variations. Tridecane was discovered about equivalent sum in the two assortments with 17.46% and 17.38%. Yield of essential oil was observed to be 3.60% in mango peelings of Dusehri, while 3.7% in Chaunsa assortment. Current examination demonstrated that peelings of mango varieties could be utilized to obtain numerous beneficial elements as well as the potential for utilizing them in various industrial and pharmaceuticals.

Keywords: *Mangifera indica* varieties, Dusehri, Chaunsa, peelings, essential oil, components.

1. INTRODUCTION

Mango (*Mangifera indica* L.) is a member of the family anacardiaceae in the order Sapindales. It could be referred as king of fruits (Purse glove 1972), (Shirazi. 1991). Ancient data indicate that its actual farming as a fruit tree got its start in India well over 4000 years ago. The mango scattered throughout India at an extremely quick time. It had been evident in Indus valley, the armed forces of Alexander the Great invaded in 327 B. C. (W.B. Hayes., 1960). Mango is regarded as native to South Asia. Particularly the base of the Malayan Archipelago though DE. Candolle 1904, Popenoe 1920, Vavilov 1949-50, and Mukherjee 1951) declare that mango came from the Indo- Burma area. With an increasing global farming, the mango signifies probably the most vital exotic fruits and it's generated in entire world (Seham *et al.*, 2014).

It is actually largely present in tropical countries similar to Pakistan, India, Thailand, China, Philippine, Mexico as well as Brazil. As reported by (Muchiri, *et al.*, 2012), mango fruit takes up the 2nd place in the role of an exotic plant, behind just bananas with regards to growth and farm land employed. Currently, mango is farmed on a region of roughly about 3.7 million acres around the world (M.H.A. Jahurul *et al.*, 2015). Mango is additionally referred to as a meal fruit, on account of their prospective health and wellness properties (Gross,

2008). Mangoes are a remarkable source of vitamins A as well as phenolic compound (Hui, 2007). Mango fruits may also be vital supply of micronutrients, vitamins as well as other phytochemicals. (M.H.A. Jahurul *et al.*, 2015). Furthermore, mango fruits deliver strength, carbohydrates, proteins, phenolic compounds, essential fats and fiber, (Tharanathan, *et al.*, 2006), that happen to be imperative to standard human development, progression as well as well-being. Every single section of a mango tree, for example leaves, flowers, bark, fruit, pulp, skin as well as seed carries essential oils which are often put into use.

Mango skin is considered as waste item, it may be transformed to be used as raw material for drug manufacturing companies. These kinds of waste material can be employed for their immunostimulant, anticancer along with antimicrobial actions. (Seham *et al.*, 2014). Thus, the usage of mango by-products particularly mango peels could possibly be a cost-effective method to decrease the issue of trash removal from mango farming. Essential oils are the complicated concoctions, made up of terpenoid hydrocarbons, oxygenated terpenes and sesquiterpenes. They are derived from the plant supplementary metabolic process and are accountable for their unique fragrance. (Ester R. Chamorro *et al.*, 2012). The

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numerous uses of essential oils elucidate the significant fascination with their investigation. This kind of usage may very well be evident in the skin care sector, as factors of perfumes, ornamental skincare products, fantastic perfumes as well as condiments, in the food sector, mainly as fragrances as well as taste variants, in the drugs industry, as effective parts of medications as well as antibacterial/antimicrobials along with aromatherapy. At this time, there are numerous scientific studies wherein they are applied like an agent in exceptional chemical effects, among different purposes. The commonest techniques utilized for the commercial extraction of these kinds of oils are steam-distillation, hydro-distillation, together with extraction with solvents and expression. Essential oils are organic items that plants generate for their own requirements besides nourishment (i.e. attraction or even protection). Generally, these are intricate concoctions of all-natural substances which offer peculiar smell as well as taste to the plants. They are able to function as in-built messengers, such as security elements or plant volatile directed at pure foes as well as to draw in pollinating bugs to their host (Harrewijin *et al.* 2001).

Essential oils possess good quality attributes, which is why they are employed in various industrial sectors particularly in perfumes (Fragrances and lotions), in food items (flavoring and additives) as well as in medical products (Therapeutic action) (Zygadlo and Juliani 2000). Despite the fact that the essential oils possess numerous constituents, the ones of industrial attention are usually those made up of leading pieces, which furnish them with genuine benefits. However occasionally, the modest pieces are likewise vital since they could possibly furnish the essential oils with a chic/a fantastic fragrance.

Mango fruit peels are considered to be by-product. Consequently, substantial analysis on mango by-product is being carried out in past times years. The recent studies have demonstrated that mango by-product for instance mango fruit peels, hold high quantities of numerous health-preserving materials. Antioxidant substances in mango skin were declared to give advantageous impact on overall health in high-dietary-fiber diets (Larrauri *et al.*, 1997). Lately, mango fruit peels drawn substantial interest in the scientific society because of their substantial material of beneficial components, for instance phytochemicals, polyphenols, carotenoids, enzymes, vitamin E as well as C, that contain antioxidant characteristics (Ajila *et al.*, 2007).

2. MATERIALS AND METHODS

Two mango *Mangifera indica* L., varieties Dusehri as well as Chaunsa were obtained at ripening phase for oil extraction from Mirpurkhas, Sindh, Pakistan. Fruit

samples were rinsed with distilled water. Edible section of the fruits was taken away and then fruits peeling were cut down into fine portions before examination.

The derivation is conducted with unstable solvents, as an example petroleum ether, n-hexane, in plain extractions, the most widely used solvent extraction. Oil was obtained by Hydro-distillation method and hexane with 680C boiling point was utilized like an extraction solvent. Fresh fruit skin was drawn in round bottom flask measuring 1000 ml. filled with 400 ml. distilled water. Fruit peeling of 250 g from every range were used. Peelings were inserted in flask and heated to boiling point. An additional flask was realigned on other side having little volume of hexane for extraction. Oil was obtained by hydro-distillation technique. Set up was operated for 4 hours. Extracted oil remnants travelling with steam via condenser from round bottle flask and were then stored to the adjacent flask. After that obtained oil was shifted down into splitting funnel. Once contents were settled down, water was taken out and oil was stored in vial, weighed and kept at 40C. To get the essential oil from 1 kg fresh fruit peel of mango variations procedure was duplicated many times. Three quantities of every sample were obtained. Yielded oil from Dusehri was 3.60%, whereas 3.7% from Chaunsa mango variations. The essential oil samples acquired from mango types were evaluated by GC-MS procedures for the separation as well as classification of the elements..

GC-MS ANALYSES

The GC-MS examination was conducted by utilizing Agilent 6890 N gas chromatography as well as mass spectrometry. Blend of two effective procedures combined with an Agilent MS-5975 inert XL mass exclusive sensor as well as an Agilent auto sampler 7683-B injector. For the detachment of essential oil constituents from the concoction. Gas chromatography was employed as well as Mass spectrometry was utilized to distinguish and classify every substance separately. GC is utilized to split concoction into unique constituent by making use of a climate regulated capillary column. MS is employed to classify distinctive factors from mass spectra by in comparison these with mass spectral databases. A capillary column of HP-5MS (5% phenyl 1 methylsiloxane) 30 mx 0.25 mm i.d.; with 250 µm diameter and film thickness was 0.25 µm. The preliminary temperature of 1000C was maintained for 1 min, raised to 2000C at 50C/min. Dividing ratio was 5 :1. Helium was employed like carrier gas, with flow rate of 9.5 ml/min. The inlet/injector and detector/transfer line temperatures were 2600C and 2700C respectively. A volume 1.0 µL sample was infused with syringe sizing 10.0 µL. Overall test run time was 31 minutes. It is best to begin with less per

minute to attain the temp of 2000C to attain the elution of the heaviest terpenoid (Francisco *et al.*, 2008).

IDENTIFICATION OF ESSENTIAL OIL COMPONENTS

The objective of the collection of chromatographic conditions would be to attain a suitable splitting up of essential oil elements, for qualitative as well as quantification.

In an effort to quantify a piece by GC, you can actually utilize the techniques of both the inner or even outer standard. The relative volume of each and every single essential oil element obtained was quantified and completed by area percentage technique. The pertinent area technique brings about a percentage relation of the area in accordance with every element in relation to overall section of the chromatogram, comprehending this like the inclusion of the separate sections of every single one of these, as it is demonstrated in the following equation (Orio *et al.*, 1986).

$$\text{Rel.\% of the component} = \frac{\text{component area}}{\text{Total area}} \times 100$$

It enables us to determine the level or percentage of mass of one or numerous components that seem segregated in the chromatogram, even in the existence of unsolved peaks.

3. RESULTS AND DISCUSSIONS

Fruit peelings of Dusehri as well as Chaunsa mango variations were utilized for essential oil extraction and then identified substances checked. Overall 21 essential oil elements with certain fragrance were recognized from the two types of mango (Table. 1). Dodecane was discovered as the leading element from Dusehri whilst Borneol was identified as the biggest element from Chaunsa mango range. Tridecane was observed to be generally in equivalent quantity from the two mango variations.

Caryophyllene possesses a spicy, terpenic and woody smell the flavor is woody as well, peppery with citrus backdrop (Laohaprasit *et al.*, 2012). Borneol with

smell like camphor is employed to create scent it happens to be an organic pest repellent.

In present researches that evaluates almost all of the essential oil elements, 10 essential oil substances were discovered to be prevalent in the two variations with various amounts. Additionally, it had also been noticed in the present research that certain specific substances are to be blamed for the unique taste and scent of various mango variations. Borneol as well as Phenol furnish the channsa mango range with taste like camphor. Caryophyllene, alphaCaryophyllene and Phenol, 2, 5-bis (1, 1-dimethylethyle) – offer the special taste to Dusehri mango range.

Outputs of the current research plainly verified that essential oil obtained from the fruit peelings of various mango variations are a great way to obtain several beneficial substances. Numerous monoterpenes, sesquiterpene, alkane, alcohol, ether, ester, phenol as well as other cleansers can be seen within the fruit peelings of mango variations. Financially speaking these are quite significant and perhaps can be utilized in various businesses for instance fragrances, skincare as well as foodstuff. Medicinally these are effective for protection against numerous cancers. An additional advantage of analysis tends to be that a few of essential oil substances can be utilized like insecticide, on account of their insect repellent character. The essential oil elements of the two mango variations with their proportion were examined in contrast. A few essential oil elements were found in the two variations while some were not. The variance in occurrence as well as the proportion of essential oil substances is likely to be on account of ripening of fruit peel at various times as well as varying weather conditions.

From the chemical perspective, the essential oil proportion regularly transforms in numerous areas of the plant. Very frequently, between the various areas of the plant, phytochemical polymorphism might be created. Generally, diverse developmental levels of the plant set up variances in the oil structure within the similar organ of the plant (Chamorro *et al.*, 2008).

Table.1. Essential oil components identified in the Dusehri and Chaunsa mango varieties.

S.NO	Components	Formula	RT	V1	V2
1	Bicyclo [2, 2, 1] heptan-2-ol, 1, 7,7-trimethyl-(1S-endo) BorneolTln3	C ₁₀ H ₁₈ O	3.4591	ND	19.67±1.57
2	Dodecane	C ₁₂ H ₂₆	3.8095	19.41±1.38	15.24±0.58
3	Tridecane	C ₁₃ H ₂₈	5.4287	17.46±1.63	17.38±0.96
4	Tetradecane	C ₁₄ H ₃₀	7.3863	7.37±0.61	6.43±0.45
5	Caryophyllene	C ₁₅ H ₂₄	7.8696	5.91±0.46	ND
6	α-Caryophyllene α-Humulene	C ₁₅ H ₂₄	8.5827	2.97±0.13	ND
7	Pentadecane	C ₁₅ H ₃₂	9.5372	5.00±0.30	3.71±0.25
8	Phenol, 2,4-bis(1,1-dimethylethyl)-	C ₁₄ H ₂₂ O	9.797	ND	1.41±0.10
9	Phenol, 2,5-bis(1,1-dimethylethyl)-	C ₁₄ H ₂₀ O	9.8091	1.54±0.08	ND
10	Naphthalene, 2,3,6-trimethyl-	C ₁₃ H ₁₄	10.5222	ND	0.69±0.03
11	Hexadecane	C ₁₆ H ₃₄	11.7546	5.17±0.42	4.31±0.25
12	Heptadecane	C ₁₇ H ₃₆	13.9599	4.83±0.32	4.10±0.33
13	1-Nonadecane	C ₁₉ H ₃₈	15.9599	ND	0.68±0.03
14	Octadecane	C ₁₈ H ₃₈	16.1109	5.29±0.33	4.22±0.34
15	Methyl 7,9-tridecadienyl ether	C ₁₄ H ₂₆ O	17.7786	ND	3.84±0.33
16	Nonadecane	C ₁₉ H ₄₀	18.1954	5.94±0.47	5.81±0.41
17	Eicosane	C ₂₀ H ₄₂	20.1953	5.50±0.44	6.22±0.48
18	Heneicosane	C ₂₁ H ₄₄	22.2193	5.42±0.46	5.18±0.43
19	Docosane	C ₂₂ H ₄₆	24.7992	5.24±0.49	ND
20	Carbonic acid, hexadecyl isobutyl ester	C ₂₁ H ₄₂ O ₃	25.1135	ND	1.01±0.09
21	Tetraatriacontane	C ₃₄ H ₇₀	28.2915	2.87±0.15	ND

Abbreviations used in Table - 1.

RT-Retention Time

V1-Dusehri

V2-Chaunsa

Rel. % -Relative Percentage (n=3)

SD-Standard deviation

ND-Not detected

4. CONCLUSION

It had been learned in the present research that Dusehri as well as Chaunsa mango variations differ in color as well as proportion of oil. 3.60% of essential oil with yellowish shade was acquired from 1 KG peelings of fresh Dusehri mango range; whilst 3.7% golden yellow color was obtained from Chaunsa range.

Relatively better quantity of essential oil was found in Chaunsa (3.7), than Dusehri (3.60). Overall 21 essential oil substances with peculiar fragrances were identified from Dusehri as well as Chaunsa variations correspondingly. Tridecane was discovered practically equivalent in the two types of mangoes. Moreover, the

two variations were also identified to share ten additional essential oil substances with varied amounts. Dodecane, Tridecane, caryophyllene as well as α-caryophyllene were discovered in greater quantities in Dusehri range. Whereas BorneolTln3, Dodecane as well as Tridecane, were discovered in Chaunsa range.

Outcomes of this study suggests that GC-MS has supplied exceptional splitting up of essential oil and a lot of beneficial essential oil elements were discovered from the two types which might be beneficial fiscally as well as medicinally. Economically extremely vital as well as they could be utilized in numerous industrial sectors for instance fragrances, beauty products as well as food sector. Medicinally these could be helpful in aversion of various cancers. A few of the elements may be utilized like an insecticide, on account of their insect repellent character.

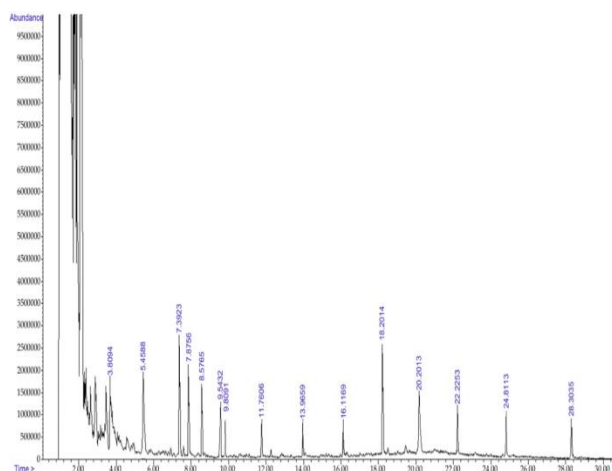


Fig.1. GC-MS Chromatogram Of Hydro-Distilled Samples Of Dusehri Variety Of Mango.

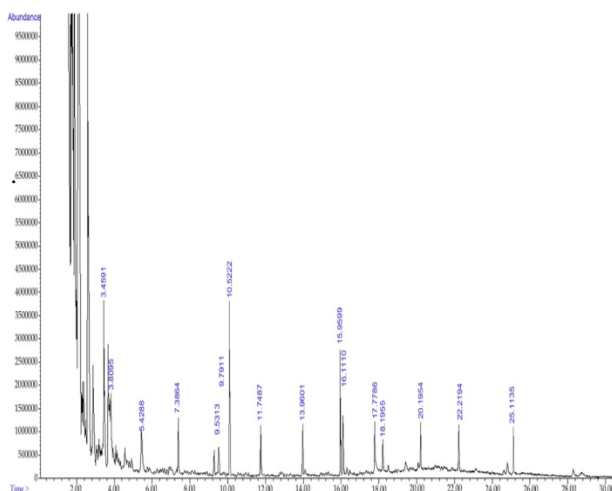


Fig.2. GC-MS Chromatogram Of Hydro-Distilled Samples Of Chaunsa Variety Of Mango.

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