



Effect of Sensorial Characteristics of Potato Chips Fried in Different Types of Edible Oils

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ABSTRACT

The present investigation was undertaken to sensory properties of potato chips fried in edible oil and refined oil under different storage condition. The effect of storage conditions and blended ratio on the quality of mustard, soybean, sunflower, groundnut oil and their blends and refined oils were analysed under storage at 210 days in Room temperature, BOD incubator and Refrigerated condition. In case of overall acceptability, of individual oil, blended and refined oils was observed highest as fresh while after storage of 210 days in BOD, room temperature and refrigerated storage; overall acceptability observed in decreasing order. The value of overall acceptability was found more suitable in individual oils as compared to blended and refined oils. Overall acceptability of oils decreased with increasing the proportion of blending to each other, Overall acceptability also affected by the ambient temperature, BOD and refrigerator condition.

Key word: Mustard oil, Soybean oil, Sunflower oil, Groundnut oil, Sensory properties.

INTRODUCTION

Vegetable oil is derived from seeds of plants. Among the oilseeds cultivated in India, from which edible oil is obtained, are groundnut, rapeseed, mustard, safflower, sunflower, soybean, linseed. The other sources of vegetable oil are palm, cottonseed, coconut and rice bran. They contain essential fatty acids which play an important role in nutrition and also carriers of fat soluble vitamins. It is estimated that about 90% of vegetable oils are used for edible purposes, while the remaining part finds industrial applications¹⁰. The exposure of oils to either a source of heat, light or moisture can alter some of the quality

indicators. The extent of alteration (spoilage) depends on the duration of exposure, temperature and condition of storage^{1,5}. Vegetable oil is an important and widely used lipid source for our everyday (diet products). Its application is increasing day by day for food purposes and for the manufacturing of a number of toiletry products¹⁰. Fats and oils are one of the five essential ingredients of human diet and the others are protein, carbohydrates, minerals and vitamins¹⁹. Rapeseed-mustard oil quality is determined by the constituent fatty acids including palmitic, stearic, oleic, linoleic, linolenic, eicosenoic and erucic acids.

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Linoleic and linolenic acids are essential fatty acids not synthesized by our body. Soybean consumption is associated with reduced risk of cancer of the breast and prostate and may enhance survival^{23,9,22,20}. Soybean is a major source of high quality protein and Oil, and soybean seed quality is often determined by seed protein, oil, fatty acid, and mineral content. Therefore, improving soybean seed quality is key to improving human and animal nutrition². Groundnut (*Arachis hypogea* L.) is an important oilseed crop as it contains 44-56% oil and 22-30% protein on a dry seed basis¹⁷. Although a range of 36–56% has been reported for oil content, groundnuts commonly contain 40–50% oil. Oil content is commonly considered to be about 48–50% and is generally independent of market type or growth habit⁴. Soybean oil has a high content of linoleic acid, and a lower level of linolenic acid. These are both essential fatty acids for humans and therefore of dietary importance, but they are also the cause of oxidative instability of this oil⁷. Soybean is a major source of high quality protein and Oil, and soybean seed quality is often determined by seed protein, oil, fatty acid, and mineral content. Environmental factors, such as air, light and temperature, accelerate oxidative reactions which might end in the production of off-flavors and odors associated with low molecular weight volatiles, discoloration¹⁴. Sunflower oil is high-quality edible oil. It is used in cooking, frying, and in the manufacture of margarine and shortening and considered by some as desirable as olive oil. Sunflower oil was selected in this study due to its high use in food as it is a rich source of linoleic acid. Furthermore, it is light in taste and appearance and has a toxic at low concentrations may be generated after destruction of the linoleic acid^{15,13}. The extraction yields are close to 100% with very good oil quality. However, the use of hexane to remove oil from the oily cake meal is an increasingly controversial^{17,12}.

MATERIAL AND METHODS

All oils (Mustard oil, soybean oil, sun flower oil and Groundnut oil) were purchases from

Shive Sales Corporation, 252, Kotla, Mayur Vihar Phase-1 Delhi- 110091 and packaging materials (PET Bottles) were purchases from local market of Meerut – 250110. Experiments were carried out to assessment of crude oil and blended oil in process and Food Engineering Laboratory of the Department of Agricultural Engineering, Sardar Vallabhbhai Patel university of Agriculture and Technology, Modipuram, Meerut. Studies were also carried out to evaluate the sensory attributes of crude, blended and refined oil filled in PET bottle under different storage condition. The sensory attributes were analysed just after preparation and during storage of 0 and 210 days under ambient condition packaging in pet bottle.

Sensory attributes: The effect of various proportions of mustard, soybean, sunflower and groundnut oil and refined oil on sensory attributes of blended edible oil and fresh refined oil are discussed in the following section. Taste value of oil is determined by frying the potato chips and serve to panelist for analyzing the taste properties. Colour of oils was determined by eyes and smells were by nose. The sensory attributes of Mustard oil (T₁), Soybean oil (T₂), Sunflower oil (T₃), Groundnut oil (T₄) and composite edible oil (T₅, T₆, T₇, T₈, T₉, T₁₀, T₁₁, T₁₂, T₁₃, T₁₄, T₁₅, T₁₆, T₁₇, T₁₈, T₁₉, T₂₀) and other Soybean refined oil (T₂₁), Groundnut refined oil (T₂₂) and Sunflower refined oil (T₂₃).

RESULTS AND DISCUSSION

Sensory attributes of different oils an fried potato chips were evaluated for fresh oil as well as stored oils in different stored conditions upto 210 days under PET bottles. The samples were subjected to a panel of 10-semi-trained judges comprising male and female (of teenager group) using 9-point Hedonic rating scale^{8,21,16}. of different eating habits^{6,3}. Sensorial attributes viz., colour, taste, smell and overall acceptability of fried potato chips in different types of edible oils.

Effect of stored edible oils on fried Potato Chips:

Room temperature stored oils: The sensory attributes content for different edible oil,

refined oil and blended edible oil presented in table 1. It is clear that colour content varied from 6.8 to 8.5 among the oils under 0 day storage. The sample T₄ had highest colour content (8.5) and lowest was found for T₁₂ (6.8) sample. The colour data recorded for room storage after 210 days ranged from 4.7 to 6.6 among the edible oil and refined oil samples. The sample T₄ had highest colour content (6.6) and lowest was found for T₁₂ (4.7) sample. The taste was found varies ranged from 6.8 to 8.4 among the oils under 0 day storage. The sample T₁ had highest taste content (8.4) and lowest was found for T₁₂ (6.8) sample. The taste data recorded for room storage after 210 days ranged from 4.6 to 6.6 among the edible oil and refined oil samples. The sample T₄ had highest taste content (6.6) and lowest was found for T₁₂ (4.6) sample. The smell was found varies ranged from 6.7 to 8.4 among the oils under 0 day storage. The sample T₄ had highest smell content (8.4) and lowest was found for T₁₂ (6.7) sample. The smell data recorded for room storage after 210 days ranged from 4.7 to 6.5 among the edible oil and refined oil samples. The sample T₄ had highest smell content (6.5) and lowest was found for T₁₂ (4.7) sample. The overall acceptability was found varies ranged from 6.8 to 8.4 among the oils under 0 day storage. The sample T₁ had highest overall acceptability content (8.4) and lowest was found for T₁₂ (6.8) sample. The overall acceptability data recorded for room storage after 210 days ranged from 4.7 to 6.6 among the edible oil and refined oil samples. The sample T₄ had highest overall acceptability content (6.6) and lowest was found for T₁₂ (4.7) sample.

BOD (35 °C) stored oils: The table 2 showed the sensory attributes content of individual edible oil, refined oil and blended edible oil. The colour data ranged from 6.8 to 8.5 among the oils under 0 day storage. The sample T₄ had highest colour content (8.5) and lowest was found for T₁₂ (6.8) sample. The colour data recorded for BOD storage after 210 days ranged from 5.0 to 6.9 among the edible oil and refined oil samples. The sample T₄ had highest colour content (6.9) and lowest was

found for T₈ (5.0) sample. The taste was found varies ranged from 6.8 to 8.4 among the oils under 0 day storage. The sample T₁ had highest taste content (8.4) and lowest was found for T₁₂ (6.8) sample. The taste data recorded for BOD storage after 210 days ranged from 5.1 to 6.8 among the edible oil and refined oil samples. The sample T₄ had highest taste content (6.8) and lowest was found for T₈ (5.1) sample. The smell was found varies ranged from 6.7 to 8.4 among the oils under 0 day storage. The sample T₄ had highest smell content (8.4) and lowest was found for T₁₂ (6.7) sample. The smell data recorded for BOD storage after 210 days ranged from 5.1 to 6.9 among the edible oil and refined oil samples. The sample T₄ had highest smell content (6.9) and lowest was found for T₁₂ (5.1) sample. The overall acceptability was found varies ranged from 6.8 to 8.4 among the oils under 0 day storage. The sample T₁ had highest overall acceptability content (8.4) and lowest was found for T₁₂ (6.8) sample. The overall acceptability data recorded for BOD storage after 210 days ranged from 5.1 to 6.9 among the edible oil and refined oil samples. The sample T₄ had highest overall acceptability content (6.9) and lowest was found for T₈ (5.1) sample.

Refrigerated oils: The sensory attributes fresh edible oil, refined oil and blended edible oil are presented in table 3. The colour data ranged from 6.8 to 8.5 among the oils under 0 day storage. The sample T₄ had highest colour content (8.5) and lowest was found for T₁₂ (6.8) sample. The colour data recorded for refrigerator storage after 210 days ranged from 6.0 to 7.2 among the edible oil and refined oil samples. The sample T₄ had highest colour content (7.2) and lowest was found for T₈ (6.0) sample. The taste was found varies ranged from 6.8 to 8.4 among the oils under 0 day storage. The sample T₁ had highest taste content (8.4) and lowest was found for T₁₂ (6.8) sample. The taste data recorded for refrigerator storage after 210 days ranged from 6.1 to 7.3 among the edible oil and refined oil samples. The sample T₄ had highest taste content (7.3) and lowest was found for T₁₂

(6.1) sample. The smell was found varies ranged from 6.7 to 8.4 among the oils under 0 day storage. The sample T₄ had highest smell content (8.4) and lowest was found for T₁₂ (6.7) sample. The smell data recorded for refrigerator storage after 210 days ranged from 6.0 to 7.2 among the edible oil and refined oil samples. The sample T₄ had highest smell content (7.2) and lowest was found for T₁₂ (6.0) sample. The overall acceptability was

found varies ranged from 6.8 to 8.4 among the oils under 0 day storage. The sample T₁ had highest overall acceptability content (8.4) and lowest was found for T₁₂ (6.8) sample. The overall acceptability data recorded for refrigerator storage after 210 days ranged from 6.0 to 7.2 among the edible oil and refined oil samples. The sample T₄ had highest overall acceptability content (7.2) and lowest was found for T₁₂ (6.0) sample.

Table 1: Sensory attributes of fried potato chips in Room temperature stored oils

Parameter Treatment	Colour		Taste		Smell		Overall acceptability	
	0	210	0	210	0	210	0	210
T ₁	8.4	6.5	8.4	6.5	8.3	6.4	8.4	6.5
T ₂	8.3	6.4	8.2	6.5	8.3	6.4	8.3	6.4
T ₃	8.4	6.5	8.0	6.5	8.2	6.3	8.2	6.4
T ₄	8.5	6.6	8.3	6.6	8.4	6.5	8.4	6.6
T ₅	7.6	5.4	7.6	5.4	7.6	5.4	7.6	5.4
T ₆	7.4	5.3	7.4	5.3	7.4	5.3	7.4	5.3
T ₇	7.5	5.1	7.3	5.2	7.4	5.2	7.4	5.2
T ₈	7.2	5.0	7.2	5.0	7.2	5.1	7.2	5.0
T ₉	7.7	5.3	7.7	5.4	7.6	5.3	7.7	5.3
T ₁₀	7.3	5.2	7.3	5.2	7.3	5.2	7.3	5.2
T ₁₁	7.1	4.9	7.0	4.9	7.1	4.9	7.1	4.9
T ₁₂	6.8	4.7	6.8	4.6	6.7	4.7	6.8	4.7
T ₁₃	7.5	5.4	7.4	5.5	7.5	5.4	7.5	5.4
T ₁₄	7.2	5.1	7.2	5.1	7.3	5.2	7.2	5.1
T ₁₅	6.9	5.1	6.8	5.1	6.9	5.1	6.9	5.1
T ₁₆	6.8	4.9	6.8	4.9	6.8	5.0	6.8	4.9
T ₁₇	7.7	5.2	7.7	5.2	7.7	5.2	7.7	5.2
T ₁₈	7.5	5.0	7.6	5.2	7.6	5.1	7.6	5.1
T ₁₉	7.2	4.9	7.2	4.8	7.2	4.9	7.2	4.9
T ₂₀	7.0	4.8	7.0	4.9	7.0	4.8	7.0	4.8
T ₂₁	8.2	6.2	8.2	6.3	8.0	6.2	8.1	6.2
T ₂₂	8.0	6.5	8.1	6.5	8.1	6.4	8.1	6.5
T ₂₃	8.0	6.4	8.0	6.5	8.0	6.4	8.0	6.4
CD	0.320	0.147	0.384	0.156	0.336	0.143	0.109	0.091

Description :- Mustard oil (T₁), Soybean oil (T₂), Sunflower oil (T₃), Groundnut oil (T₄) and blended edible oil (T₅, T₆, T₇, T₈, T₉, T₁₀, T₁₁, T₁₂, T₁₃, T₁₄, T₁₅, T₁₆, T₁₇, T₁₈, T₁₉, T₂₀) and other Soybean refined oil (T₂₁), Groundnut refined oil (T₂₂) and Sunflower refined oil (T₂₃).

Table 2: Sensory attributes of fried potato chips in BOD (35 °C) stored oils

Parameter Treatment	Colour		Taste		Smell		Overall acceptability	
	0	210	0	210	0	210	0	210
T ₁	8.4	6.8	8.4	6.7	8.3	6.8	8.4	6.8
T ₂	8.3	6.6	8.2	6.6	8.3	6.7	8.3	6.6
T ₃	8.4	6.7	8.0	6.7	8.2	6.7	8.2	6.7
T ₄	8.5	6.9	8.3	6.8	8.4	6.9	8.4	6.9
T ₅	7.6	5.8	7.6	5.6	7.6	5.7	7.6	5.7
T ₆	7.4	5.5	7.4	5.5	7.4	5.5	7.4	5.5
T ₇	7.5	5.4	7.3	5.5	7.4	5.5	7.4	5.5
T ₈	7.2	5.0	7.2	5.1	7.2	5.2	7.2	5.1
T ₉	7.7	5.7	7.7	5.6	7.6	5.7	7.7	5.7
T ₁₀	7.3	5.5	7.3	5.4	7.3	5.6	7.3	5.5
T ₁₁	7.1	5.2	7.0	5.3	7.1	5.2	7.1	5.2
T ₁₂	6.8	5.0	6.8	5.2	6.7	5.1	6.8	5.1
T ₁₃	7.5	5.6	7.4	5.5	7.5	5.6	7.5	5.6
T ₁₄	7.2	5.3	7.2	5.4	7.3	5.4	7.2	5.4
T ₁₅	6.9	5.1	6.8	5.2	6.9	5.1	6.9	5.1
T ₁₆	6.8	5.2	6.8	5.3	6.8	5.2	6.8	5.2
T ₁₇	7.7	5.9	7.7	5.7	7.7	5.8	7.7	5.8
T ₁₈	7.5	5.5	7.6	5.6	7.6	5.5	7.6	5.5
T ₁₉	7.2	5.3	7.2	5.4	7.2	5.3	7.2	5.3
T ₂₀	7.0	5.0	7.0	5.1	7.0	5.2	7.0	5.1
T ₂₁	8.2	6.7	8.2	6.7	8.0	6.6	8.1	6.7
T ₂₂	8.0	6.6	8.1	6.7	8.1	6.7	8.1	6.7
T ₂₃	8.0	6.4	8.0	6.6	8.0	6.5	8.0	6.5
CD	0.320	0.241	0.384	0.292	0.336	0.306	0.109	0.117

Description :- Mustard oil (T₁), Soybean oil (T₂), Sunflower oil (T₃), Groundnut oil (T₄) and blended edible oil (T₅, T₆, T₇, T₈, T₉, T₁₀, T₁₁, T₁₂, T₁₃, T₁₄, T₁₅, T₁₆, T₁₇, T₁₈, T₁₉, T₂₀) and other Soybean refined oil (T₂₁), Groundnut refined oil (T₂₂) and Sunflower refined oil (T₂₃).

Table 3: Sensory attributes of fried potato chips in refrigerator stored oils

Parameter Treatment	Colour		Taste		Smell		Overall acceptability	
	0	210	0	210	0	210	0	210
T ₁	8.4	7.0	8.4	7.1	8.3	7.0	8.4	7.0
T ₂	8.3	7.1	8.2	7.0	8.3	7.2	8.3	7.1
T ₃	8.4	6.9	8.0	6.9	8.2	7.0	8.2	6.9
T ₄	8.5	7.2	8.3	7.3	8.4	7.2	8.4	7.2
T ₅	7.6	6.5	7.6	6.6	7.6	6.5	7.6	6.5
T ₆	7.4	6.3	7.4	6.3	7.4	6.4	7.4	6.3
T ₇	7.5	6.2	7.3	6.3	7.4	6.2	7.4	6.2
T ₈	7.2	6.0	7.2	6.2	7.2	6.1	7.2	6.1
T ₉	7.7	6.5	7.7	6.6	7.6	6.6	7.7	6.6
T ₁₀	7.3	6.2	7.3	6.3	7.3	6.4	7.3	6.3
T ₁₁	7.1	6.2	7.0	6.4	7.1	6.2	7.1	6.3
T ₁₂	6.8	6.0	6.8	6.1	6.7	6.0	6.8	6.0
T ₁₃	7.5	6.4	7.4	6.4	7.5	6.5	7.5	6.4
T ₁₄	7.2	6.3	7.2	6.2	7.3	6.3	7.2	6.3
T ₁₅	6.9	6.2	6.8	6.3	6.9	6.2	6.9	6.2
T ₁₆	6.8	6.1	6.8	6.1	6.8	6.2	6.8	6.1
T ₁₇	7.7	6.5	7.7	6.5	7.7	6.6	7.7	6.5
T ₁₈	7.5	6.3	7.6	6.4	7.6	6.3	7.6	6.3
T ₁₉	7.2	6.2	7.2	6.2	7.2	6.4	7.2	6.3
T ₂₀	7.0	6.3	7.0	6.4	7.0	6.3	7.0	6.3
T ₂₁	8.2	7.0	8.2	7.0	8.0	7.0	8.1	7.0
T ₂₂	8.0	6.9	8.1	6.8	8.1	7.1	8.1	6.9
T ₂₃	8.0	6.8	8.0	6.9	8.0	6.8	8.0	6.8
CD	0.320	0.336	0.384	0.283	0.336	0.318	0.109	0.116

Description :- Mustard oil (T₁), Soybean oil (T₂), Sunflower oil (T₃), Groundnut oil (T₄) and blended edible oil (T₅, T₆, T₇, T₈, T₉, T₁₀, T₁₁, T₁₂, T₁₃, T₁₄, T₁₅, T₁₆, T₁₇, T₁₈, T₁₉, T₂₀) and other Soybean refined oil (T₂₁), Groundnut refined oil (T₂₂) and Sunflower refined oil (T₂₃).

CONCLUSIONS

Colour of individual oil, blended and refined oils was observed highest as fresh while after storage of 210 days in BOD, Room temperature and Refrigerated storage observed in decreasing order. The value colour of oils varied between for individual (6.4-6.6), blended oils (4.9) room storage. The value of colour was found more suitable in individual oils as compared to blended and refined oils. Colour of oils decreased with increasing the proportion of blending to each other, temperature of room storage, BOD and refrigerator condition are also affect the

colour. At higher temperature, the pigment of oils is adversely affected colour. The colour of the oil becomes light dark with increasing the temperature of storage. In case of taste, of individual oil, blended and refined oils was observed highest as fresh while after storage of 210 days in BOD, Room temperature and Refrigerated storage decrement in taste observed. The value of taste was found more suitable in individual oils as compared to blended and refined oils. Taste of oils decreased with increasing the proportion of blending to each other, temperature of room storage, BOD and refrigerator condition are

also affect the taste. In case of smell, of individual oil, blended and refined oils was observed highest as fresh while after storage of 210 days in BOD, room temperature and refrigerated storage; shows in decreasing order. The value of smell was found more suitable in individual oils as compared to blended and refined oils. Smell of oils decreased with increasing the proportion of blending to each other, temperature of room storage, BOD and refrigerator condition are also affect the smell. In case of overall acceptability, of individual oil, blended and refined oils was observed highest as fresh while after storage of 210 days in BOD, room temperature and refrigerated storage; overall acceptability observed in decreasing order. The value taste of oils varied between for individual, blended oils room storage. The value of overall acceptability was found more suitable in individual oils as compared to blended and refined oils. Overall acceptability of oils decreased with increasing the proportion of blending to each other, overall acceptability also affected by the temperature of room storage, BOD and refrigerator condition.

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