ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 7, Issue, 04, pp.14953-14955, April, 2015

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

MICROBIAL PROPERTIES OF COLD PRESS MORINGA OIL

***Janaki, S. and Mrs. Yamuna Devi, P.**

Dept. of Homescience, Mother Teresa Women's University, Chennai, Tamil Nadu, India

ARTICLE INFO

Article History:
Received 06th January, 2015
Received in revised form
22nd February, 2015
Accepted 06th March, 2015
Published online 30th April, 2015

Key words:

Moringa oil,
Olive oil,
Sunflower oil,
Microbial properties,
Cold press oil.

ABSTRACT

Moringa seed oil is a well-known oil for its physicochemical properties and so used in many industrial applications. Now, the functional properties of moringa oil made it has a good edible oil. The moringa oil extracted by traditional cold press method was a pale yellow colour liquid oil at room temperature with palatability and a nutty flavour. According to literature, it has natural antioxidant which keep it stable for many years. Hence the present study was designed in curiosity to analyse moringa oil prepared potato recipes both shallow fry and deep fry for microbial load, which was compared with olive oil, due to its similarity in property and with sunflower oil, which was most preferred cooking oil in Chennai city.

INTRODUCTION

Moringa seed oil is used for cooking soap manufacturing, cosmetic base and as carrier oil. Seeds yields 38-40 per cent of non- drying oil, known as Ben oil. Oil is clear, sweet and odourless, never become rancid (Indian Materia Medica, vol. II; pg. 811-816). The antioxidant inhibition results of the free radical showed inhibition above average which was an indication of high antioxidant advantage. The oil was found to be good commercially, and its production and consumption is highly recommended (Ojiako and Okeke, 2013). The study by Khattab and Shakak (2012), showed that the chemical composition of moringa oil contained high oil content (43.79 per cent), and this means the seed of moringa tree is a good source of edible oil. The oil extracted from moringa seeds has good physicochemical properties in such a way that no additional processing operations methods will be needed for the oil. The oil has good quantity of oleic acid and omega3; therefore it can be used for frying and other food purposes. Moringa oil is recommended for frying purposes because it contains high amount of oleic acid (57 per cent) and omega 3 (13.28 per cent). Moringaoleifera Jaffna variety seed contains edible oil rich in natural antioxidants. The consumption of this oil may provide health benefits in terms of hypocholesterolemic effects (due to the presence of phytosterols) and scavenging of free radicals in the body (due to the presence of tocopherols, phenolics and carotenoids). The crude seed oil from the Indian moringaoleifera Jaffna variety, being rich in monounsaturated oleic acid and poor in polyunsaturated fatty acid contains surplus amounts of natural antioxidants and also exhibits better antiradical activity. It may also provide better bioavailability of its inherent natural antioxidants to the human body (Bhat Nagar and Gopala Krishnan, 2013). The present study was designed to determine the microbial properties of cold pressmoringa oil which was compared with olive oil, due to its similarity in properties and with sunflower oil, which was the most preferred cooking oil in Chennai, according to a study of Rajaveni and Ramasamy, (2011).

Corresponding author: Janaki, S.
Dept. of Homescience, Mother Teresa Women's University, Chennai, Tamil Nadu, India.

MATERIALS AND METHODS

Potato which is bland in taste were selected to analyse the microbial property of three different oils. Two recipes were prepared with same ingredients but different oil. Roasted fry potato recipe (shallow fry) and french fries (deep fry) were prepared with the three different oils. The potato samples prepared with three different oils, three shallow fried samples and three deep fried samples, each weighing about 100 grams were packed hygienically in polyethylene pouch of forty micron thickness and sealed by impulse sealer and coded as EO (experimental oil) which was moringa oil, CO (control oil) which was olive oil and SPO (preferred oil) which was sunflower oiland given for microbial analysis to A to Z laboratory, Chennai, Tamil Nadu, India. The assay was done on the initial 0th day, 5th day, 10th day and on the final 15th day. The screening of the potent and harmful microorganisms like Escherichia coli, Salmonella Species, Pseudomonas

aeruginosa, Staphylococcus aureus, total bacterial count and total yeast and mould in the sample recipes were assessed.

RESULTS AND DISCUSSION

The results of microbial analysis of shallow fry potatoes with three different oils are illustrated in Table 1. The results of microbial analysis of deep fried potatoes with the three different oils are illustrated in Table 2. The microbial analysis reports of the potatoes prepared with three different oils were done on the initial 0^{th} day, 5^{th} day, 10^{th} day and final 15^{th} day.

There was a numerous count in total yeast and mould on 15^{th} day in both shallow and deep fry potatoes prepared with three oils. Total bacterial count on 15^{th} day was found to be 175 cfu/g in EO, 180 cfu/g in CO and 200 cfu/g in SPO of shallow fry potatoes and in deep fry it was found to be 165 cfu/g in EO, 180 cfu/g in CO and 195 cfu/g in SPO prepared potatoes.The level of increase in total bacterial count in EO prepared was lesser than CO, due to the presence of γ-tocopherol content, which act as an antioxidant. Whereas, SPO prepared potatoes were found with more number of microbes due to absence or loss of antioxidant during refining.

Table 1. Microbial analysis of shallow fry potatoes

Pathogens	0^{th} Day			5^{th} Day			10^{th} Day			15^{th} Day		
	EO	CO	SPO	EO	CO	SPO	EO	CO	SPO	EO	CO	SPO
Escherichia coli	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Salmonella species	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Pseudomonas aeruginosa	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Staphylococci aureus	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Total yeast and mould	Nil	Nil	Nil	10 cfu/g	15 cfu/g	40 cfu/g	20 cfu/g	35 cfu/G	60 cfu/g	TNTC	TNTC	TNTC
Total bacterial count	Nil	Nil	Nil	50 cfu/g	65 cfu/g	90 cfu/g	70 cfu/g	80 cfu/g	130 cfu/g	175 cfu/g	180 cfu/g	200 cfu/g

EO-Experimental oil, CO-Control oil, SPO- sunflower prefered oil.
Cfu-Colonies forming unit.
TNTC-Too Numerous To Count.

Table 2. Microbial analysis of deep fry potatoes

Pathogens	0^{th} Day			5^{th} Day			10^{th} Day			15^{th} Day		
	EO	CO	SPO	EO	CO	SPO	EO	CO	SPO	EO	CO	SPO
Escherichia coli	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Salmonella species	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Pseudomonas aeruginosa	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Staphylococci aureus	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Total yeast and mould	Nil	Nil	Nil	8 cfu/g	12 cfu/g	30 cfu/g	12 cfu/g	30 cfu/g	60 cfu/g	TNTC	TNTC	TNTC
Total bacterial count	Nil	Nil	Nil	40 cfu/g	60 cfu/g	80 cfu/g	60 cfu/g	80 cfu/g	120 cfu/g	165 cfu/g	180 cfu/g	195 cfu/g

EO-Experimental oil, CO-Control oil, SPO- Sunflower preferedoil.
Cfu-Colonies forming unit.
TNTC-Too Numerous To Count.

The report revealed that the potatoes prepared with three different oils were free from harmful pathogens like Escherichia coli, Salmonella species, Pseudomonas aeruginosa and Staphylococcus aureus on 0^{th} day to 15^{th} day. Total yeast and mould and total bacterial count was absent on 0^{th} day in all the three potato samples of shallow fry and deep fry. There was an increase in total yeast and mould count on 5^{th} day which accounted to 10 cfu/g in EO, 15 cfu/g in CO and 40 cfu/g in SPO of shallow fry potatoes and in deep fry an increase of total yeast and mould was found to be 8 cfu/g in EO, 12 cfu/g in CO and 30 cfu/g in SPO. The increase in total yeast and mould reached 20 cfu/g in EO, 35 cfu/g in CO and 60 cfu/g in SPO in shallow fry potatoes on 10^{th} day. In deep fry potatoes there was an increase of total yeast to 12 cfu/g in EO, 30 cfu/g in CO and 60 cfu/g in SPO on 10^{th} day.

Total bacterial count on 5^{th} day in shallow fry prepared potato was found to be 50 cfu/g in EO, 65 cfu/g in CO and 90 cfu/g in SPO and in deep fry potatoes it was found to be 40 cfu/g in EO, 60 cfu/g in CO and 80 cfu/g in SPO. There was an increase in total bacterial count on 10^{th} day in shallow fry potatoes to 70 cfu/g in EO, 80 cfu/g in CO and 130 cfu/g in SPO. An increase of 60 cfu/g in EO, 80 cfu/g in CO and 120 cfu/g in SPO of total bacterial count in deep fry potatoes on10^{th} day.

The tocopherol content of cold press moringa oil was found to be α-tocopherol content was up to 17 times lower than olive oil and δ-tocopherol and γ-tocopherol content was 2 times higher than olive oil (Janaki, 2015). The tocopherol content of moringa seed oil extracted by cold press of PKM1 variety (periyakulam 1), India, showed similar results (Lalas and Tsakins, 2002). The total tocopherols of CPMSO (cold press moringa seed oil) and HEMSO (hexane extracted moringa seed oil) were found to be 95.5 and 90.2 mg/Kg (Ogunsina *et al*., 2011). Moringa oil of Mbololo from Kenya was much higher than olive oil. Most vegetable oils contain α-, β-, and γ-tocopherols. δ-Tocopherol exists in a few oils such as cottonseed, peanut, wheat germ, soybean, and castor oils (Lalas and Tsakins, 2002). The antioxidant activity of δ-tocopherol exceeds that of γ-, β-, and α-tocopherol (Bourgeois and Czornomaz, 1982; Von Pongracz *et al*., 1984). Thus, tocopherols present in moringa oil are expected to offer some protection during storage and processing (Tsakins *et al*., 1999).

Conclusion

The keeping quality of moringa oil was due to its natural antioxidant content especially γ-tocopherol content. The present study revealed that the antioxidant property of cold

pressed moringa oil will make it a stable edible oil in both domestic and in food industry for preparation of longer storage food items. This property can make moringa oil a better substitute for olive oil in the food industry in developing countries of Asia and Africa, where the availability of moringa is very common.

Future Scope

Extraction of moringa oil by solvent extraction and determining its microbial properties.

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