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Sensory quality and cost of production of instant soy coffee

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ABSTRACT

Enriched coffee with great nutritional value can be prepared without caffeine at a lower cost from soybean. Instant coffee powder was prepared from using soybeans, fenugreek, jaggery and skim milk powder. Soybean and fenugreek were roasted followed by the addition of skimmed milk powder and jaggery in appropriate proportion. On the basis of organoleptic evolution results the 2nd treatment showed high overall acceptability. From the results it is concluded that good quality of coffee can be prepared by using 15 per cent soy powder. The product is also economically viable as the cost of production is very low as compared to available commercial coffee in the market and the utilization of soybean will give more income to the farmers.

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Key Words : Coffee, Soybean, Fenugreek, Jaggery, Skimmed milk powder

INTRODUCTION

Coffee [*Coffea arabica* L.] is an important beverage used all over the world. Brazil and Columbia are the largest coffee producers in the world. In India, the production of coffee is about 4.00 lakh tonnes in the year 2003-04. The current domestic consumption of coffee is about 65,000 tonnes (Shrilakshmi, 2007). It is mainly used as a beverage in the form of aqueous extract prepared from roasted and powdered beans. The constituents that are of chiefly significance in the making of the beverages are caffeine, flavour substances and bitter substances (Panda, 2001).

For most healthy adults, moderates amounts of caffeine 200-300 mgs a day or the 2-3 cups of coffee do not produce any problem (Shrilakshmi, 2007). Drinking excess of coffee causes high acidity in the stomach, gastric ulcer, loss of appetite, high blood pressure, craving for smoking tobacco, nervousness, insomnia, palpitation of the heart, excessive urination, damage to the kidneys and causes impotency, nervous tension, headache, excess of perspiration, neuralgia, intolerance to pain, over sensitiveness, uric acid diathesis, hysteria etc. (Panda, 2001). Caffeine also disrupts day time sleep (Julie, 2006) and may prove risky for cardiac patients (CMP Media, New Zealand, 2006).

Today, the search for substitute is motivated more by health concerns over caffeine, which can trigger peptic ulcers, exacerbate migraines and may contribute to fibrocystic breast disease (Emily, 2006). Soycoffee is very active in educating the people on the dangers of caffeine addiction, supporting legislation against bio-engineered food and lobbying the FDA to force manufacturers to reveal the exact amount of caffeine in products offered to consumers. Claudia Del Vecchio, founder of soycoffee maker well-Bean coffee co. explained that the on average, one six-ounce cup of soycoffee blend yields about two grams of soy protein and about 28 milligrams of "Isoflavones". The FDA recommends a daily soy protein intake of 25grams.

Soycoffee preserves certain soy characteristics as

- Caffeine-free
- Aid digestion
- Lower blood cholesterol levels
- Promote gastrointestinal health
- Prevent bone loss and slow the advancement of osteoporosis
- Promote healthy menopause
- Fight heart disease
- Promote healthy prostate
- Prevent cancer, particularly colon, rectal, and breast cancer

Soy product may helps to control both type-2 diabetes and high blood pressure. However, information regarding the replacement of caffeine from coffee prepared from coffee beans for its side effects by preparation of soycoffee using soybean as a food ingredient is lacking. Hence, the entire study was planned.

METHODOLOGY

Soybeans, Skimmed milk powder, Fenugreek seeds, Jaggery and Coffee (coffee beans) were obtained from local market. Soybeans were allowed to soak for overnight and the water was drained out. Then they were dehydrated at 60-70ºC for 6-8 hrs. The soybeans were roasted in open pan till they get brown followed by dehulling. The fine powder of soybean was prepared by grinding. The fenugreek seeds were soaked for overnight and germinated. Then dehydrated at 60-70ºC and powdered in grinder. The jaggery was bitten in small pieces and dried till it gets totally dehydrated. It is then grinded to prepare powder.

Table a: Treatment details

	Treatment			
Ingredient (g)	T_0	T_1	T_2	T_3
Soy powder		10	15	20
Jaggery powder		58.5	53.5	48.5
Skimmed milk powder		30	30	30
Fenugreek powder		1.5	1.5	1.5

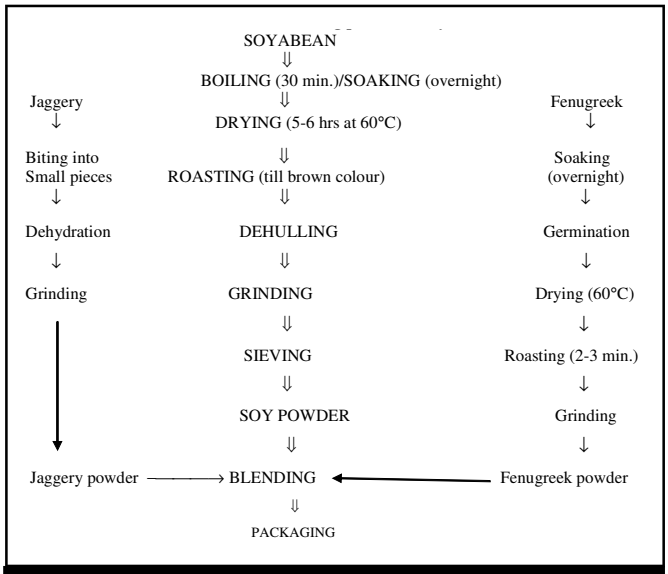

Fig. a: Flow chart of manufacturing process of soycoffee

The blend was then mixed well in the boiled water as per the proportions *i.e.* 10 gram powder in 100 ml water. Soybeans and treatment wise representative samples of soycoffee were subjected to physical and chemical evaluation, respectively.

Sensory evaluation and cost of production:

The soycoffee samples were subjected to sensory evaluation by panel of judges immediately after mixing the prepared instant soycoffee powder in boiled water. Every sample was given code number which was changed from trial to trial to hide the identity of the product. The panel evaluated the product for sensory characteristics like colour, flavour, and taste. '9' point Hedonic scale given by Amerine *et al.* (1965) was used for qualitative organoleptic evaluation. The expenses on materials used and mis expenditures at prevailing retail market rates during the experimental period were considered for estimation of cost production of beverages under study.

OBSERVATIONS AND ASSESSMENT

It is evident from the review of literature that soybean can be used to prepare caffeine free, highly nourishing, economically viable and easy to make beverage, which also have health benefits. The present investigation was undertaken to evaluate the suitability of soy powder for replacement of caffeine from coffee prepared from coffee beans.

The chemical composition of soybean showed that it is a good source of protein and minerals. It is rich in protein content and contains about 43.2 g per 100 g, it also contains good amount of fat and minerals.

Table 1: Chemical composition of soybean

Protein	43.2 %
Fat	19.5 %
Carbohydrates	20.9 %
Energy	68 Kcal

Sensory evaluation of soycoffee:

Sensory evaluation of any consumable product is an integral part of quality assurance programme. The word quality, in relation to food is commonly the degree of excellence with respect to its palatability. The samples of soycoffee were evaluated by using the standard scorecard. The assessment was done by studying the characters like colour, flavour, taste and overall acceptability. The panel of semi trained judges consisting of six members was given samples of fresh from the four treatments for evaluation of their organoleptic quality by using 9 point Hedonic scale. Each treatment was given code number. This was changed during each replication to avoid its identity.

Results revealed that with increase in level of soy powder from 10 to 20 per cent there was variation in sensory score related to colour, flavour, taste and overall acceptability. Amongst various levels of soy powder used in blend for the preparation of coffee, the highest overall score obtained was 7.2 for coffee prepared with the level of 15 per cent soy powder. It is also evident from the table that the coffee prepared with the utilization of soy

powder at 5, 10 and15 per cent level were compared to the coffee prepared from coffee bean powder (control) on the basis of acceptance of the products by consumer. The results shows the utilization of soy powder at 15 per cent level reported maximum scores with respect to all sensory characters in Table 2.

Table 2: Average score of sensory attributes of soy coffee

Treatments	Sensory attributes			
	Colour	Flavour	Taste	Overall acceptability
T_0	7.3	6.9	6.9	6.9
T_1	7.2	6.8	6.8	7.0
T_2	7.4	7.0	7.0	7.3
T_3	7.3	6.9	6.9	7.0

It is revealed from the Table 2 that the average scores obtained for colour attribute of samples T_0, T_1, T_2, and T_3 were 7.3, 7.2, 7.4 and 7.3, respectively. The variation in the color of soycoffee might be due to the lack of maintaining proper intensity of heating at the stage of making.

It is seen from the Table 2 that the average scores obtained for flavour attribute of samples were 6.9, 6.8, 7.0 and 6.9 for treatment T_0, T_1, T_2, and T_3, respectively. Moreover sample T_2 (7.0) secured highest score over rest of other samples, while sample T_1 (6.8) secured least score amongst them. The variation in the flavour may be due to the use of different levels of ingredients.

It is seen from the Table 2 that the average scores obtained for taste attribute within the range of 6.8-7.0. Moreover sample T_2 (7.0) secured highest score over rest of other samples, while sample T_1 (6.8) secured least score amongst them. The variation in the flavour may be due to the use of different levels of ingredients.

The overall acceptability of soycoffee was determined on the basis of average of score recorded for different sensory attributes *viz.,* color, flavour and taste. It is observed from Table 2, that the average score for overall acceptability was 6.9, 7.0, 7.3 and 7.0 for T_0, T_1, T_2 and T_3, respectively. The coffee bean powder can be very well replaced by the soy powder up to the extent of 15 per cent for the preparation of coffee is higher acceptability in respect of colour, flavour and taste as compared to other treatment.

Cost of production of soycoffee (based on cost of ingredients only) :

One of the main objectives of the present investigation was to study the effects of different levels of soy powder on the cost of soycoffee. The list of items of expenditure and their contribution for calculating per unit cost of soycoffee are given in Table 3. The cost of production of soycoffee was worked out by taking into account prevailing markets rates of various inputs. However, the depreciation cost of building, packaging and equipment have not taken in to account as the production was on laboratory scale. The cost of production of soycoffee was calculated considering the running cost of ingredients/supplies.

Cost Rs. 1.00 per cup without milk and sugar.

- Final weight of product = 1000 g
- Total number of cup of coffee prepared = 200
- Weight of one cupful of soycoffee = 5 g
- Cost of one cupful of soycoffee = Rs. 0.369, Rs. 0.371 and Rs. 0.373 for treatments T_1, T_2 and T_3, respectively.

It may be pointed out here that data includes the cost of ingredients. The highest cost Rs. 1.00/cup was recorded in case of control (T_0). As far as the total cost of production of soycoffee was concerned, 1 kg of blend gave 200 nos. of cupful of coffee each of 5 g, Total cost of production of soycoffee for 1 kg is Rs. 73.87, Rs. 74.27 and Rs. 74.67 for T_1, T_2 and T_3, respectively. Therefore, cost of one cupful soycoffee was 0.369 Rs. 0.371 Rs. and 0.373 Rs. for T_1, T_2 and T_3 , respectively, which was very low as compared to available commercial coffee in the market (Table 3).

Table 3: Cost of production of soycoffee

Sr. No.	Ingredients	Rate/kg. (Rs.)	Treatments					
			T_1		T_2		T_3	
			Quantity (g)	Price (Rs.)	Quantity (g)	Price (Rs.)	Quantity (g)	Price (Rs.)
1.	Soybean	40	100	4.0	150	6.0	200	8.0
2.	Jaggery	32	585	18.72	535	17.12	485	15.52
3.	Skimmed milk powder	168	300	50.4	30	50.4	300	50.4
4.	Fenugreek seeds	50	15	0.75	15	0.75	15	0.75
5.	Cost/g (Total)			73.87		74.27		74.67
6.	Cost/5 g			0.369		0.371		0.373

Note: The market sample of coffee was used as control (T_0) for comparison.

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