International Journal of Processing and Post Harvest Technology

RESEARCH PAPER

Formulation and quality evaluation of hot beverage nutritive soya fee as a substitute of coffee

■ LEENA MURALIDHARAN* AND SREENATH PILLAI[1]

Department of Zoology, V.K. Krishna Menon College of Commerce and Science, Bhandup (E), MUMBAI (M.S.) INDIA (Email : leena.doctor@gmail.com)

[1]Department of Microbiology and Fermentation Technology, Jacob School of Biotechnology and Bio-engineering, Sam Higginbottom Institute of Agriculture, Technology and Sciences, ALLAHABAD (U.P.) INDIA

*Author for Correspondence

Research chronicle : Received : 22.02.2013; **Revised :** 17.11.2013; **Accepted :** 27.11.2013

SUMMARY :

The soybean [*Glycine max* (L.) Merrill] has been called the "miracle crop" because of its vast array of uses. They are rich in protein and contain beneficial phytochemicals such as iso- flavones, which may help fight chronic diseases. Coffee contains caffeine which can, in due course of the time, increase risk of heart diseases, insomnia or disrupted sleep, infertility problems, high blood pressure, miscarriage, panic, anxiety and overall stress and a horde of other diseases. Hence, hot beverage nutritive soya fee was prepared. Soaked, split and dried soya beans were roasted at two temperatures 170^{0}C (T_1) and 160^{0}C (T_2) for 8 minutes up to dark brown and medium brown colours which were then coarsely ground and used to make a beverage that tastes quite similar to coffee with the addition of cardamom and ginger powder in the milk. Samples were evaluated at the intervals of 15, 30, 45 and 60 days for sensory and chemical analysis. It was found that moisture content was slightly increased; fat and protein content were slightly decreased during storage whereas no significant difference in ash content of samples T_1 and T_2 was noticed during the storage. On the basis of overall sensory attributes, colour of sample T_1 has better appearance as compared to T_2. Flavour, aroma, taste, after taste and overall acceptability of sample T_1 has got higher score than sample T_2 because of the dark brown colour of the powder. Its score slightly decreased during storage. After chemical analysis, it was found that sample T_2 had high percentage of protein and other nutrients. The shelf life of product was stable up to 60 days during storage period.

KEY WORDS : Soya bean, Hot beverage nutritive soya fee, Coffee, Protein, Roasting, Powder

How to cite this paper : Muralidharan, Leena and Pillai, Sreenath (2013). Formulation and quality evaluation of hot beverage nutritive soya fee as a substitute of coffee. *Internat. J. Proc. & Post Harvest Technol.*, **4** (2) : 106-113.

The soya plant [*Glycine max* (L.) Merrill] was cultivated in China before 3000 B.C. and was classified as one of the five sacred crops. The first written record is a 2200 B.C. farming manual advising Chinese farmers how to get the best from their crop. Soybean has been an important food ingredient of China, Manchuria, Japan, Korea, and Malaysia over centuries. It is becoming increasingly popular in Europe and US among health and diet conscious people. In India, Madhya Pradesh, Maharashtra, Rajasthan and Andhra Pradesh are the major producers of soybean. Madhya Pradesh tops the list with around 88% of total soybean production. During 1997-98, total soybean production in the state was 49.19 metric tons which was about 84.2% of the total produce (U.S. 1988).

The soybean has rightly been termed the "miracle crop" due to its vast array of uses. It is a legume related to clover, peas and alfalfa and is native to East Asia. Soybean is highly

proteinaceous and contains the beneficial phytochemicals such as iso- flavones, which may help fight chronic diseases. Soya protein is a complete protein. It is the only plant protein that is equivalent to animal protein. A mature soybean is 38% protein, 30% carbohydrate, 18% oil and 14% moisture, ash and hull. With 50% proteins/g, it is two times richer than pulses (*dals*) or peanuts, three times richer than eggs and eleven times richer than milk. Besides, soya foods are rich source of vitamin B complex and contain essential minerals like magnesium, calcium, iron, potassium and copper (Glami, 2002). Soya protein may help to reduce the risk of heart disease by lowering cholesterol and increasing the flexibility of blood vessels. Soybeans also contain important bio-active components that have begun to show promise in relieving menopausal symptoms, maintaining healthy bones, and preventing cancer (*www.healthierus.gov*).

It has been shown that for legumes, a soaking operation prior to cooking is necessary while heat processing improves protein quality. In order to obtain the maximum protein quality, a much shorter cooking time was needed for the soaked samples than for the unsoaked ones (Molina *et al.,* 1975). Soya flour is made from roasted soybeans that have been ground into a fine powder. Rich in high quality protein and other nutrients, soya flour also adds a pleasant texture and flavour to a variety of products. Natural or full fat soya flour contains the natural oils that are found in the soybean.

Soybeans are roasted and coarsely ground so that they can be used to make a beverage that tastes quite similar to coffee. This hearty brew with its roasted nutlike aroma is caffeine- free, highly nourishing, inexpensive and easy to make. Soya coffee is a much healthier alternative to regular coffee. It is rich and satisfying, full bodied and gluten-free. Once the soybeans are roasted, the brew tastes much like regular coffee, without the acid stomach that regular coffee can cause. Soya coffee provides the benefits of soya with a coffee taste. Soybeans provide all eight of the essential amino acids not manufactured by the body. Soya contains complex carbohydrates, vitamin B and iron; it is lactose-free and gluten-free. With soya coffee a variety of benefits that aid in digestion, lower blood cholesterol levels, promote healthy menopause, improve sleeping, fight heart diseases, increase lean muscle mass, prevent cancer particularly colon, rectal and breast cancer. And most especially promote younger looking skin, soya coffee. This is because of the iso- flavones a beneficial substance in soya. Soya fee is naturally caffeine-free. It is roasted and ground to brew and taste just like coffee (*www.soyacoffee.com*).

Soya is used as soybean oil, Soya milk, Tofu, Miso, Shoyu, soya protein, Okara (Whey), soya fee, soya desserts, soya cheese, soya Health, soya yoghurt.

Highly nourishing and caffeine-free, soya coffee is a great healthier alternative for some people who find the need to remove caffeine from their diet. Over time, caffeine can increase risk as well as worsen the ailments such as allergies, heart diseases, insomnia or disrupted sleep, infertility problems, high blood pressure, miscarriage, panic, anxiety and overall stress and a horde of other diseases (Kaslow, 2003).

Therefore, keeping in view of the above points, the present study was proposed to formulate the hot beverage nutritive soya fee and study the shelf life of soya fee with the following objectives :

- To formulate the hot beverage nutritive soya fee.
- To evaluate the soya fee nutritionally and organoleptically.
- To study the shelf life of hot beverage nutritive soya fee.

EXPERIMENTAL METHODS

Soybean, sugar, milk, cardamom and ginger powder were procured from the local market of Allahabad, Uttar Pradesh.

Hot beverage nutritive soya fee was prepared by using sound and good quality of soybean. Firstly soybeans were cleaned and graded, washed and soaked in equal amount of water for about 24- 38 hours. After soaking, soybeans were split by hand- rubbing to remove their outer husk. Swollen yellow- coloured split soybeans were dried in a tray drier at 90^0C for 4-5 hours. After half an hour, they were spread uniformly in the tray drier to remove the moisture from the splits at the interval of 20 minutes till level of 8-9% moisture was reached in the splits. Soaked, split and dried soybeans were roasted at two temperature 170^0C (T_1) and 160^0C (T_2) for 8 minutes up to dark brown and medium brown colour appearance after which they were coarsely ground in a mixture, packed in a aluminum coated HDPE bags for shelf life study and further use. These samples were used to make a beverage that tastes quite similar to coffee with the addition of sugar, cardamom and ginger powder in the milk. These samples were stored at room temperature. Samples were evaluated initially and after at the interval of 15, 30, 45 and 60 days for sensory and physico-chemical analysis.

The samples were analyzed for moisture content by using standard method (AOAC, 1995) and ash, protein and fat content were analyzed by using (Ranganna,1986). After preparing soya fee, all the samples were evaluated for colour, flavour, aroma, taste, after taste and overall acceptability using 9-point Hedonic scale (Amerine *et al.*, 1965).

Data obtained from physico- chemical analysis were subjected in terms of average scores for different attributes and analyzed statistically. The data pertaining to different sensory attributes for soya fee from two roasting temperature were analyzed with the help of Factorial Completely Randomized Design (FCRD) to find out the effect of temperature on hot

beverage nutritive soya fee. Analysis of variance' (ANOVA) technique, two way classification, and critical difference were performed (Gupta, 1997) to determine the best treatment.

EXPERIMENTAL FINDINGS AND ANALYSIS

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Quality analysis of hot beverage nutritive soya fee powder :

During present investigation, it was observed that there were significant changes in moisture content and fat content after roasting process. As shown in Fig. 1, after treatment moisture content for treatment T_1 was 3.99g and for T_2 was 4.82g. Fat content after roasting for treatment T_1 was 15.14g and for treatment T_2 was 16.17g/100 g. There was slightly change in protein. Protein content after roasting for treatment T_1 was 35.15g and for treatment T_2 was 35.59 g/100 g. No significant changes were obtained in ash content after roasting for treatment T_1 (4.27/100 g) and for treatment T_2 (4.26/100 g). Similar results were also discussed by Bloch (1997).

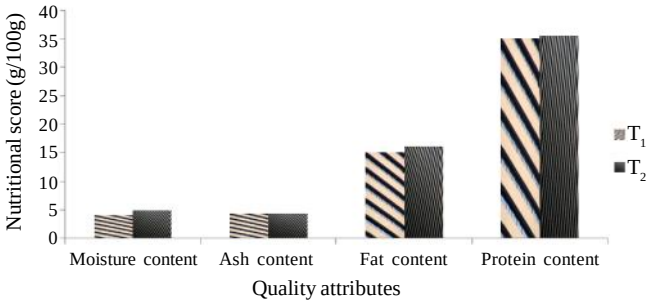

Fig. 1: Overall quality analysis of hot beverage nutritive soya fee powder

The roasting process changes physicochemical characteristics of split soybeans, and increases nutrients concentrations, these factors have an effect on the final product. There were slight decreases in the per cent of fat content and protein content of different treatments (T_1, T_2).

Physico-chemical characteristics of hot beverage nutritive soya fee during shelf life study :

Effects on the percentage of moisture content of hot beverage nutritive soya fee powder during storage **:**

The per cent moisture score for T_1 was 3.99 per cen ton 0 day, 4.05per cent after 15 days, 4.13 per cent after 30 days, 4.23 per cent after 45 days and 4.27 per cent after 60 days. Similarly for sample T_2 scored 4.82 per cen ton 0 day, 4.94 per cent after 15 days, 5.01 per cent after 30 days, 5.16 per cent after 45 days and 5.23 per cent after 60 days. It was increased during storage. Similar results were also discussed by (Kornauth, 1907).

There were significant changes in both treatments. Fig. 2 shows the effect of different treatment and storage periods on per cent moisture content of sample T_1 and T_2. The data clearly indicates that there was slight increase in moisture content of sample T_1 and T_2 during storage period for (0day, 15days, 30days, 45 days and 60 days).

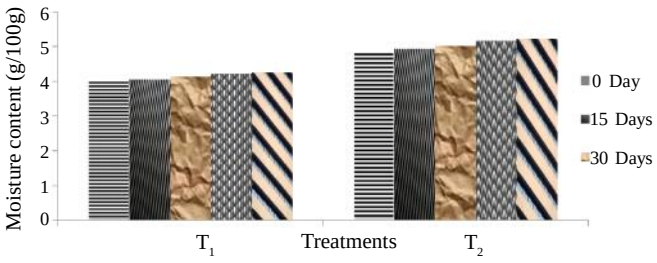

Fig. 2: Effects on the percentage of moisture content of hot beverage nutritive soya fee powder during storage

The effect of storage period on moisture content of soya fee powder packed in HDPE aluminum coated bags. The analysis of variance ANOVA at 5% showed significant results. Moisture content of soya fee powder packed in HDPE increased considerably with increase in storage period. Increase in the moisture content of soya fee powder samples may be due to the hygroscopic nature of the powder and change in the relative humidity during storage. The moisture contents should be below 14% to prevent microbial growth and chemical changes during storage (Pyler, 1971), depending on the prevailing relative humidity.

From ANOVA, it is evident that the calculated value of F due to treatment is greater than the tabulated value at 5 per cent probability level. Therefore, it can be concluded that significant effect of treatment on moisture content of T_1 and T_2 sample was observed at interval of 15 days during the shelf life study.

Effects on the percentage of ash content of hot beverage nutritive soya fee powder during storage **:**

The ash content in the food stuff represents inorganic matters remaining after the organic matters have been burnt. The per cent ash score for T_1 was 4.27 per cent on 0 day, 4.27 per cent after 15 days, 4.25 per cent after 30 days, 4.27 per cent after 45 days and 4.26 per cent after 60 days. Similarly for sample T_2 scored 4.26 per cent on 0 day, 4.27 per cent after 15 days, 4.26 per cent after 30 days, 4.24 per cent after 45 days and 4.24 per cent after 60 days. There were very slight variations on the percentage of samples during storage. Similar results were also discussed by Bloch (1997).

Fig. 3 shows the effect of different treatment and storage periods on per cent ash content of T_1 and T_2. The data clearly indicate that there were no significant differences in ash content of sample T_1 and T_2 during storage. The ash content in food

stuff not necessarily accounts for exactly the same composition as the mineral matter present in the original food, there may be some losses due to volatilization or some interaction between the constituents (Kirk and Sawyer, 1991). Anjum *et al.* (2003) have reported non-significant effect of storage on ash content of wheat flour samples. The similar non-significant effect has been observed in the present study during storage of soya fee powder.

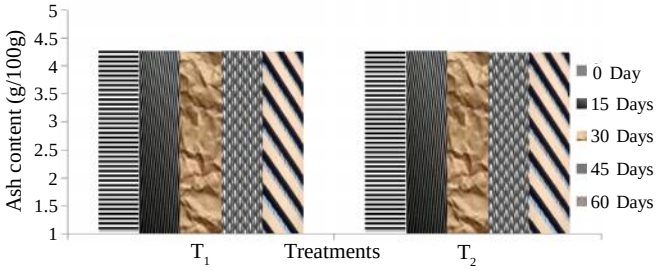

Fig. 3: Effects on the percentage of ash content of hot beverage nutritive soya fee powder during storage

From ANOVA, it is evident that the calculated value of F due to treatment is smaller than the tabulated value at 5 per cent probability level. Therefore, it can be concluded that no significant effect on the treatment of ash content of T_1 and T_2 sample were observed at interval of 15 days during the shelf life study.

Effects on the percentage of fat content of hot beverage nutritive soya fee powder during storage **:**

The per cent fat score for T_1 was 15.14 per cen ton 0 day, 15.06 per cent after 15 days, 15.00 per cent after 30 days, 14.98 per cent after 45days and 14.96 per cent after 60 days. T_2 scored 16.17 per cent on 0 day, 16.12 per cent after 15 days, 16.07 per cent after 30 days, 16.00 per cent after 45 days and 15.97 per cent after 60 days. It was decreased during storage. Similar results were also discussed by (Kornauth, 1907).

Fig. 4 shows the effect of different treatment and storage periods on per cent fat content of T_1 and T_2. The data clearly indicate that there were slight decreases in fat content of sample T_1 and T_2 during storage. The results in the present study showed that there was a significant decrease in the fat content of soya fee powder during storage. The decrease in fat content in flours may be attributed to the development of rancidity. The fat deterioration during storage may be attributed to activity of lipase enzyme which split off the fat into free fatty acids and glycerol in the presence of catalyst like moisture, light and heat (Leelavathi *et al.*, 1984).

From ANOVA, it is evident that the calculated value of F due to treatment is greater than the tabulated value at 5 per cent probability level. Therefore it can be concluded that significant effect of treatment on fat content of T_1 and T_2 sample was observed at interval of 15 days during the shelf life study.

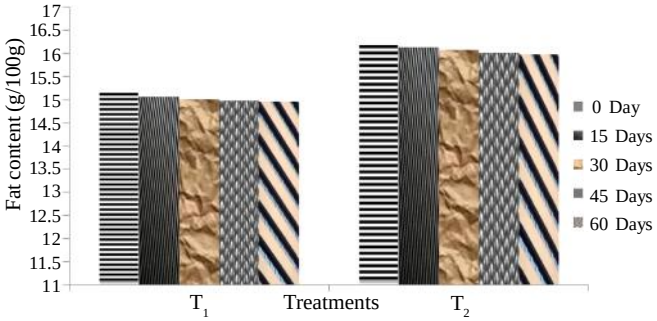

Fig. 4: Effects on the percentage of fat content of hot beverage nutritive soya fee powder during storage

Effects on the percentage of protein content of hot beverage nutritive soya fee powder during storage **:**

The per cent protein score for T_1 was 35.15 per cent on 0 day, 35.12 per cent after 15 days, 35.07 per cent after 30 days, 35.03 per cent after 45 days and 34.98 per cent after 60 days. T_2 scored 35.53 per cent on 0 day, 35.53 per cent after 15 days, 35.47 per cent after 30 days, 35.42 per cent after 45 days and 35.38 per cent after 60 days. Similar results were also discussed by (Plumb, 1994).

Fig. 5 shows the effect of different treatments and storage periods on per cent protein content of sample (Tý and T_2) at 15 days intervals during storage. The data clearly indicated that there was slight decrease in protein content of sample T_1 and T_2. The protein content of sample T_1 was higher than sample T_2. This is due to in the present study the formulation is based on different roasting temperature of soya fee powder sample T_1 had a higher temperature at 170^0C for 8 minute and sample T_2 at 160^0C for 8 minute. Sample T_1 had a higher amount of protein compared to sample T_2, therefore, there was significant difference between the samples.

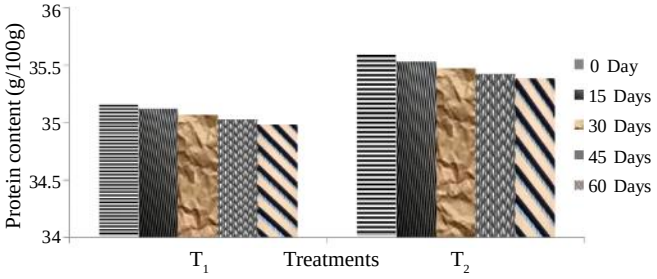

Fig. 5: Effects on the percentage of protein content of hot beverage nutritive soya fee powder during storage

Protein values found in the legumes are in agreement with data presented by other authors (Kutos *et al.*, 2003). Thermal treatment of legumes (as cooking) makes the consumption of these foods possible. The process considerably decreased naturally existing anti nutritional factors, increasing availability of others nutrients, such as

protein (Domene and Oliveira, 1993). From ANOVA, it is evident that the calculated value of F due to treatment is greater than the tabulated value at 5 per cent probability level. Therefore, it can be concluded that significant effect of treatment on protein content of T_1 and T_2 sample was observed at interval of 15 days during the shelf life study.

Organoleptic characteristics of hot beverage nutritive soya fee during shelf life study :

Mean score of sensory attributes for hot beverage nutritive soya fee **:**

The mean sensory evaluations were done for general colour, flavour, aroma, taste, after taste and over all acceptability as shown in Fig. 6; it is evident that the calculated value of F due to treatment are greater than the table value of F on 1 and 2 degree of freedom at 5% probability level. Therefore, it can be concluded that there was significant difference between the treatments. The result was depicted from the mean sensory score of below mentioned parameters that the hot beverage nutritive soya fee (T_1) had scored 8.4 in between like very much and like extremely on a nine point Hedonic scale for over all acceptability and hot beverage nutritive soya fee (T_2) had scored 7.8 in between like moderately and like very much on a nine point Hedonic scale for over all acceptability. Similar results were also discussed by Kushner, (2003).

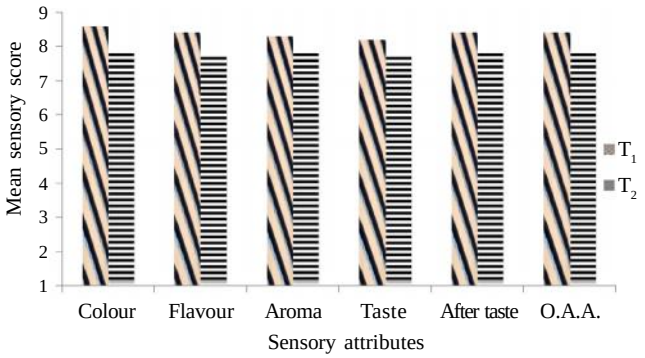

Fig. 6: Mean score of sensory attributes for hot beverage nutritive soya fee

Hot beverage nutritive soya fee sample had a brown colour due to roasting of soybean splits powder addition and this increases the appeal of the product and its nutritive value during standardization of final soya fee. The hot beverage nutritive soya fee were analyzed on the basis of 9- point Hedonic scale rating test on 0 day, 15 days, 30 days, 45 days and 60 days storage and tabulated in Fig. 6 after comparing the mean sensory score of all attributes after the storage period.

Effects on the colour of hot beverage nutritive soya fee during shelf life study **:**

The sensory score for colour T_1 was 8.7 on 0 day and continues up to 30 days, increased 8.8 after 45 days and decreased 8.6 after 60 days. Similarly sample T_2 scored 8.0 on 0 day, 7.9 after 15 days, 7.8 after 30 days, 7.9 after 45 days and continues after 60 days. Similar results were also discussed by Morse (1983).

Fig. 7 shows the effect of different treatments and storage periods on the colour of sample (T_1 and T_2) at 15 days intervals during storage. The data clearly indicated that there was slight variation in colour of sample T_1 and T_2 during storage. The colour of sample T_1 got higher score than sample T_2. This is due to in the present study the formulation is based on different roasting temperature of soya fee powder Sample T_1 had a higher temperature at 170^0C for 8 minute and sample T_2 at 160^0C for 8 minute. Sample T_1 had a higher roasted brown colour powder compared to sample T_2, therefore, there were significant difference between the samples. Colour had given pleasing, acceptable appearance like a quite similar to coffee or tea.

From ANOVA, it is evident that the calculated value of F due to treatment is greater than the tabulated value at 5 per cent probability level. Therefore, it can be concluded that significant effect of treatment on sensory colour of T_1 and T_2 sample were observed at interval of 15 days during the shelf life study.

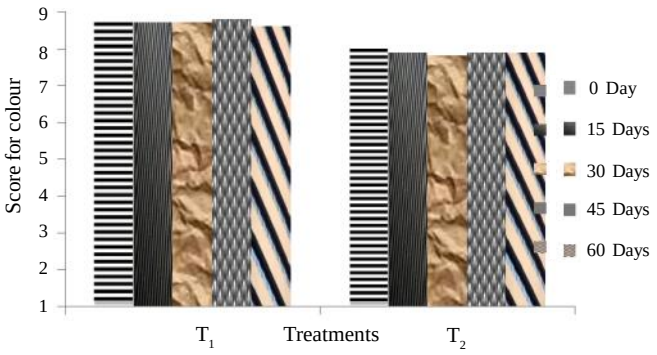

Fig. 7: Effects on the colour of hot beverage nutritive soya fee during shelf life study

Effects on the flavour of hot beverage nutritive soya fee during shelf life study **:**

The sensory score for flavour T_1 was 8.4 on 0 day and continued up to 30 days, decreased 8.3 after 45 days and again increased 8.4 after 60 days. Similarly sample T_2 scored 8.0 on 0 day, 7.9 after 15 days, 7.9 after 30 days, 7.8 after 45 days and continued after 60 days. Similar results were also discussed by (Felberg *et al.*, 2010).

Fig. 8 shows the effect of different treatments and storage periods on the flavour of sample (T_1 and T_2) at 15 days intervals during storage. The data clearly indicated that there were slight variations on flavour of sample T_1 and T_2 during storage. The flavour of sample T_1 got higher score than sample T_2. This is

due to in the present study the formulation is based on different roasting temperature of soya fee powder Sample T_1 and sample T_2. Flavouring substances such as cardamom and ginger powder were added in the samples at the same quantity during final product preparation. Sample T_1 had a higher roasted brown colour powder compared to Sample T_2, therefore, there were significant difference between the samples. Samples had given pleasing, acceptable flavour and aroma in mouth of olfactory glands for longer time which satisfies like a coffee or tea. It's flavour also quite similar to coffee.

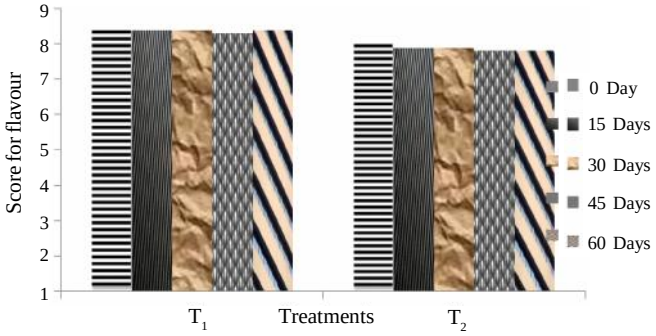

Fig. 8: Effects on the flavour of hot beverage nutritive soya fee during shelf life study

From ANOVA, it is evident that the calculated value of F due to treatment is greater than the tabulated value at 5 per cent probability level. Therefore, it can be concluded that significant effect of treatment on sensory flavour of T_1 and T_2 sample were observed at interval of 15 days during the shelf life study.

Effects on the taste of hot beverage nutritive soya fee during shelf life study **:**

The sensory score for taste T_1 was 8.5 on 0 day and 8.4 after 15 days continued up to 30 days, decreased 8.3 after 45 days and increased 8.5 after 60 days. Similarly, sample T_2 scored 8.2 on 0 day, continued up to 45 days and increased 8.3 after 60 days. Similar results were also discussed by Kushner (2003).

Fig. 9 shows the effect of different treatments and storage periods on the taste of sample (T_1 and T_2) at 15 days intervals during storage. The data clearly indicated that there were slight variations in taste of sample T_1 and T_2 during storage. The taste of sample T_1 was got higher score than sample T_2. This is due to in the present study the formulation is based on different roasting temperature of soya fee powder Sample T_1 and sample T_2. Flavouring substances such as cardamom, ginger powder and sugar as a sweetening agent were added in the samples at the same quantity during final product preparation. Sample T_1 had a higher roasted brown colour powder compared to sample T_2, therefore, there were significant differences between the samples. Samples had given pleasing, acceptable taste in mouth for longer time which satisfies like a coffee or tea. It's taste also quite similar to coffee.

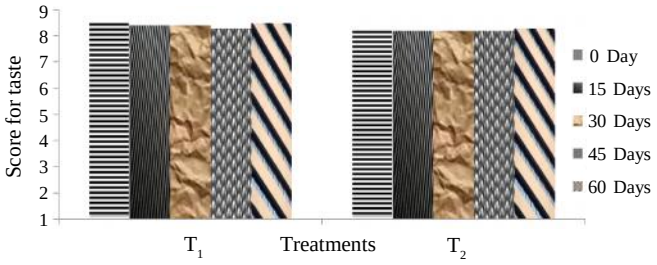

Fig. 9: Effects on the taste of hot beverage nutritive soya fee during shelf life study

From ANOVA, it is evident that the calculated value of F due to treatment is greater than the tabulated value at 5 per cent probability level. Therefore, it can be concluded that significant effect of treatment on sensory taste of T_1 and T_2 sample were observed at interval of 15 days during the shelf life study.

Effects on the overall acceptability of hot beverage nutritive soya fee during shelf life study **:**

The sensory score for overall acceptability T_1 was 8.4 on 0 day, 8.3 after 15 days, again 8.4 after 30 days, 45 days and 60 days. Similarly sample T_2 scored 7.8 on 0 day, 7.7 after 30, 45 days, 7.8 after 45 days and continued up to 60 days. Similar results were also discussed by (Collings, 1998).

Fig. 10 shows the effect of different treatments and storage periods on the overall acceptability of sample (T_1 and T_2) at 15 days intervals during storage. The overall acceptability of sample T_1 got higher score than sample T_2. This is due to in the present study the formulation is based on different roasting temperature of soya fee powder sample T_1 and sample T_2. Sample T_1 has a higher roasted brown colour powder compared to sample T_2, therefore, there were significant differences between the samples. Samples had given pleasing, acceptable taste, flavour, aroma, taste and overall acceptability in mouth for longer time which satisfies like a coffee or tea. It's overall acceptability also quite similar to coffee.

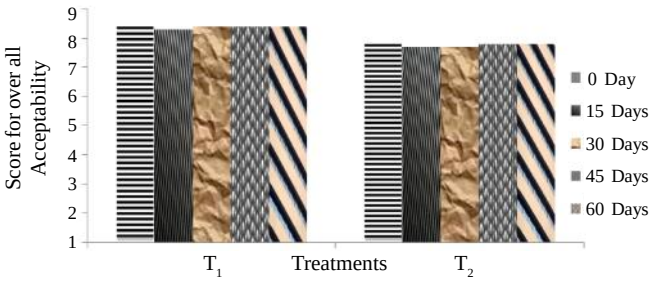

Fig. 10: Effects on the overall acceptability of hot beverage nutritive soya fee during shelf life study

From ANOVA, it is evident that the calculated value of F due to treatment is greater than the tabulated value at 5 per cent probability level. Therefore, it can be concluded that significant effect of treatment on sensory overall acceptability of T_1 and T_2 sample were observed at interval of 15 days during the shelf life study.

Conclusion :

These samples were stored at room temperature. Samples were evaluated initially and after at the interval of 15, 30, 45 and 60 days for sensory and physicochemical analysis. On the basis of study following findings were drawn.

- There was a variation between two samples due to temperature difference, sample T_1 was roasted at 170^0C for 8 minutes and sample T_2 was roasted at 160^0C for 8 minutes till dark brown and medium brown color appeared, respectively. So it affected on sensory and nutritional quality of both the sample.
- There was slight variation in color of samples T_1 and T_2. According to sensory analysis, it was found that color of sample T_1 had better appearance as compared to T_2. Flavor, aroma, taste, after taste and overall acceptability of sample T_1 got higher score than sample T_2 because of dark browning color and coffee like taste. The sensory score for overall acceptability of sample T_1 was 8.4 in between like very much and like extremely and sample T_2 scored 7.8 in between like moderately and like very much by nine point Hedonic scale. Sensory score were decreased during storage period of both the samples.
- According to physicochemical analysis, nutritional qualities of both the sample slightly decreased at each interval of 15 days during storage period. But it was found that sample T_2 contained higher percentage of fat and protein content as compared to sample T_1 because of high roasting temperature of sample T_1. It was decreased during storage period of both the samples.
- Moisture content of soya fee powder packed in HDPE aluminum coated bags increased considerably with increase in storage period at each interval of 15 days. The per cent moisture content for T_1 was 3.99 per cent on 0 day and 4.27 per cent after 60 days. Similarly for sample T_2 content was 4.82 per cent on 0 day and 5.23 per cent after 60 days. It was increased during storage period.
- The data clearly indicate that there were no significant differences in ash content of sample T_1 and T_2 during storage. The per cent ash content for T_1 was 4.27 per cent on 0 day and 4.26 per cent after 60 days. Similarly for sample T_2 content was 4.26 per cent on 0 day and 4.24 per cent after 60 days. There were very slight variations on the percentage of samples during storage period.
- Organoleptic evaluation showed that hot beverage nutritive soya fee prepared by roasting temperature 170^0C (T_1) was found to be more acceptable as compared to sample 160^0C (T_2) as it gave good colour, flavour, aroma, taste, mouth feel and overall acceptability. Ash content of both the samples had no significance difference. Sample T_2 contained higher percentage of fat and protein content as compared to sample T_1, hence, it was nutritionally better. Soya fee also used as infant formula. Soya fee is ideal for people who would like neat their alternative to regular coffee. Soya fee is regarded as regimen for man in all seasons without discrimination of nature, time, place or age.

LITERATURE CITED

Amerine, M.A., Pangborn, R.M. and Roessler, E.B. (1965). *Principles of sensory evaluation of food*, Acad. Press, London, UNITED KINGDOM

Anjum, F.M., Rehman, S., Butt, M.S. and Huma, N. (2003). Report on stability and acceptability components of the project on iron fortification of wheat flour. Inst. Food Sci. and Technol. Univ. Agric. Faisalabad, Pakistan.

AOAC (1995). *Official methods of analysis* (16th Ed.) (pp. 27–29). Washington, DC: Association of Official Analytical Chemists.

Chopra, R. and Prasad, D.N. (1994). Standardization of soaking conditions for soybean seeds/cotyledons for improved quality of soyamilk. *Indian J. Animal Sci.,* **64** (4) : 405–410.

Collings (1998). Philadelphia, PA. Soya fee contains no tannic acid.

Domene, S.M.A. and Oliveira, A.C. (1993). The use of nitrogen-15 labelling for the assessment of leguminous protein digestibility. *J. Nutr. Sci. & Vitaminol.*, **39**(1) : 47–53.

Felberg, Ilana, Deliaza, Rosires, Farah, Adriana and Calado, Eronica (2010). Formulation of a soya-coffee beverage by response surface methodology and internal preference mapping. J. Sensory Studies, 25 (Supplement) 226-242 Pub., Wiley-Blackwell.

Glami, S.Y. (2002). Chemical composition and nutritional attributes of selected newly developed lines of soybean (*Glycine max* (L.) *Merrill*). *J. Sci. Food Agric.,* Nigeria, **82**: 1735-1739.

Gupta (1997). *Fundamental of mathematical statistics handbook*, 2nd Ed. pp.212-214.

Kaslow, J. (2003). Health issues associated with coffee and caffine, Drkasiow.com.

Kirk, S.R. and R. Sawyer (1991). *Pearson's composition and analysis of foods*. 9th ed. Addison Wesley Longman Ltd. Edinburg Gate, Harlow, England.

Kushner, M. (2003). Coffee substitute product and process for preparing a soybean extract, Patent co-operation treaty application, patno: WO04098316.

Kutos, T., Golob, T., Kac, M. and Plestenjak, A. (2003). Dietary ?bre content of dry and processed beans. *Food Chem.,* **80**(2) : 231–235.

Leelavathi, K., Haridas, R.P., Indrani, D. and Shurpalekar, S.R. (1984). Physico-chemical changes in whole wheat flour (atta) and resultant atta during storage. *J. Food Sci. Technol.*, **21**(2): 68-71.

Molina, M.R., De La Euente, G. and Bressani, R. (1975). Interrelationships between storage, soaking time, cooking time, nutritive value and other characteristics of the black bean (*Phaseolus vulgaris* L.). *J. Food Sci.,* **40** (3) : 587–591.

Pyler, E.J. (1971). *Baking science and technology*. Siebel, Chicago. 546 pp.

Ranganna (1986). *Hand book of analysis and quality control for fruit and vegetable products*. 2nd. Ed. pp. 7-8, 10-12, 21-24.

WEBLIOGRAPHY

Bloch (1997). Composition of a sweetened soya coffee. Dictionary of History of Soybeans and Soya foods: by *www.soyainfocenter. com*.

Kornauth (1907). Composition of a sweetened soya coffee. by *www.soyainfocenter.com*

Morse (1983). Health coffee, dictionary of history of soybeans and Soyafoods: by *www.soyainfocenter.com*

Plumb (1994). Purdue Agricultural Experiment Station in a bulletin on the use of roasted soybeans as a coffee substitute. *www.soyainfocenter.com*

U.S. (1988). Soyafoods directory, Indian Soybean board. *http://www.soyafoods.com*

www.healthierus.gov/dietaryguidelines/

www.soyacoffee.com

www.soyafoods/nutrition/ soyaflour.html