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Standardization and evaluation of soy-bael- based spaghetti for geriatric group of society

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Abstract

Fresh flours of soybean, viz full fat, defatted and germinated were incorporated with whole wheat flour at varying levels of 10.0, 20.0 and 30.0 per cent along with 15.0, 30.0 and 45.0 per cent bael pulp to prepare a pasta product like spaghetti. The prepared products were analyzed for protein, fat and crude fibre. In the prepared products nutrients were observed to increase as compared to whole wheat flour. Among the three flours, spaghetti prepared from defatted soy flour contained highest protein, ash and crude fibre. Defatted samples obtained least amount of fat. Hence, soy flours can effectively be utilized for the preparation of spaghetti suitable for health conscious subjects as well as for geriatrics.

Keywords: Bael, soybean, geriatrics, pasta, spaghetti.

Introduction

Nutrition and ageing are inseparably connected; eating habits affect the progress of many degenerative diseases associated with ageing such as osteoporosis, cardiovascular diseases, etc. Earlier, the elderly received little attention as a target population for specialized food products but now this concept has changed with the growth of the elderly population. Over the years that followed, the scientific community finally reached a consensus that fortification and enrichment is advisable in specific situations and is largely responsible for the elimination of some specific nutritional deficiencies (Leville and Cloutier, 1986). Soy protein is one such protein having high biological value and balanced essential amino acid pattern. It can be adequately exploited to eliminate malnutrition in the country. Soy protein and soy fibre benefits relate to the reduction of several chronic diseases i.e. cancer, heart disease, diabetes and osteoporosis. On the other hand, the importance of bael fruit lies in its nutritive and curative properties. It is a good source of riboflavin and ascorbic acid; often prescribed for stomach problems. Therefore, an attempt has been made to assess the effect of processing on the nutritional value of soybean to make pasta product with bael fruit complementation; especially for geriatrics.

Material and Methods

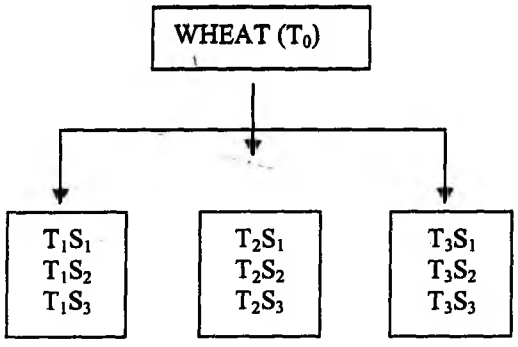
Whole wheat flour and bael was procured from local market. Fresh and ripe fruits free from blemishes were sorted out; pulp was prepared according to method standardized by Roy and Singh (1979). Thereafter, discarded the seeds and filled into sterilized jars. The soybean seeds of 'PK-416' variety were procured from the Seed Production Unit of CSKHPKV, Palampur. The seeds were washed to remove filth, dust, dried in sun and stored in airtight containers. One lot was made to flour. The other was freed from oil and the cake so obtained was milled into flour and used as defatted soy flour. Third lot was soaked in water overnight, germinated for 48 hours, dried and ground into flour to obtain germinated flour.

The preparation of pasta involved the mixing of soy flours with wheat flour and fruit pulp at their respective levels by adding optimum water. All these ingredients were mixed properly to get a desirable consistency of dough. The dough was then extruded by the hand extruder through suitable shaped dies. The product so obtained was dried for six hours at 50-55^{0}C in an air drier. After drying they were cooled and packed in polyethylene bags and stored under ambient temperature. Thereafter, ground to a fine powder for analysis. Ash, crude protein, crude fat and crude fibre were estimated by standard methods (AOAC 1990).

Table 1. Soy flour and bael pulp proportion

Soy flours (%)	Bael (%)
T_1 = 10.0	S_1=15.0
T_2 = 20.0	S_2=30.0
T_3 = 30.0	S_3=45.0

Interactions



Results and Discussion

As is clear from the tables 2, 3 and 4 that the values for the ash, fat, protein and fibre in case of whole wheat spaghetti was 1.81, 2.33, 11.56 and 2.24 per cent respectively. The values significantly increased after the addition of fullfated, defatted and germinated soy flour along with bael pulp.

Table 2. Nutritive content of fullfatted soy spaghetti

Treatments	Ash	Crude fat	Crude protein	Crude fibre
T_0	1.81	2.33	11.56	2.24
T_1S_1	1.91	4.36	14.43	2.65
T_1S_2	1.64	4.05	14.14	2.67
T_1S_3	2.20	3.73	13.87	2.80
T_2S_1	2.29	6.55	14.72	2.74
T_2S_2	2.53	6.50	14.55	2.94
T_2S_3	2.56	5.93	14.41	3.01
T_3S_1	2.66	8.71	15.12	2.84
T_3S_2	2.72	8.41	14.95	3.02
T_3S_3	2.86	8.12	14.90	3.08
Mean	2.41	6.26	14.57	2.86

Ash

When fullfated soy flour was added the values for ash ranged from 1.91-2.86 per cent, with the mean value of 2.41 per cent. The values were quite higher in case of defatted soy flour and the values ranged from 2.27-4.03 with the mean value of 2.95 per cent. The values for the same in case of germinated soy flour stood at lower ebb ranging from 1.87-2.75 having the mean value of 2.38 per cent. The sub treatments varied significantly with the addition of soy flours, however, no significant difference was observed with the fruit pulp. The increase in ash content with higher blending of soy flour has also been described earlier by Siegel *et al.* (1975). Whereas, the high ash content obtained in defatted soy spaghetti is due to the initial high content of the flour which has also been confirmed by Rawat *et al.* (1994). Decreased values in germinated soy flour can be attributed to the leaching of phytic acid into the soak water, thus reducing the ash content during germination (Lee and Karunanithy, 1990).

Table 3. Nutritive content of defatted soy spaghetti

Treatments	Ash	Crude fat	Crude protein	Crude fibre
T_0	1.81	2.33	11.56	2.24
T_1S_1	2.27	2.11	17.88	2.89
T_1S_2	2.61	2.03	17.92	3.02
T_1S_3	2.68	1.45	17.97	3.15
T_2S_1	2.55	2.11	19.30	3.26
T_2S_2	2.74	1.93	20.09	3.46
T_2S_3	3.36	1.30	20.68	3.74
T_3S_1	2.93	1.93	21.73	3.58
T_3S_2	3.36	1.78	22.41	3.68
T_3S_3	4.03	1.14	22.96	3.86
Mean	2.95	1.76	20.10	3.40

Table 4. Nutritive content of germinated soy spaghetti

Treatments	Ash	Crude fat	Crude protein	Crude fibre
T_0	1.81	2.33	11.56	2.24
T_1S_1	1.87	3.64	16.48	3.23
T_1S_2	2.22	3.42	16.98	3.39
T_1S_3	2.47	3.21	18.17	3.48
T_2S_1	2.25	5.68	17.41	3.86
T_2S_2	2.44	5.59	17.91	4.27
T_2S_3	2.50	5.24	18.17	4.26
T_3S_1	2.39	7.72	19.67	4.48
T_3S_2	2.47	7.48	19.94	4.63
T_3S_3	2.75	7.28	20.10	4.74
Mean	2.38	5.47	18.31	4.04
CD (P=0.05)				
A	0.10	0.03	0.09	0.03
AxT	0.17	0.06	0.16	0.05
TxS	NS	0.06	NS	0.05
AxTxS	0.29	0.10	0.27	0.09
Control xs Others	0.21	0.07	0.20	0.06

A= Soy Flours T= Flour proportion S= Fruit proportion

Crude fat

Highest fat content was observed in fullfated soy spaghetti with the mean value of 6.26 per cent followed by germinated (5.47%) and least by defatted soy spaghetti (1.76%). Defatted soy spaghetti contained less fat than whole wheat spaghetti (2.33%). This is due to

the freeing of oil from soybean, being used the defatted cake. The addition of soy flours (germinated and fullfated) increased the content at higher levels but no significant difference was observed with the fruit pulp. Defatted soy flour when substituted at higher levels, decreased the value which can be attributed to its lesser content. Chauhan and Bains (1985) also reported a decrease in fat content with increasing proportion of defatted soy flour in extruded rice products.

Crude protein

The crude protein content was interestingly found to increase by the incorporation of soy flours containing proteins in good amount along with bael pulp. The values in fullfatted, defatted and germinated treatments ranged from 14.87-15.12; 17.88-22.96 and 16.48-20.10 per cent respectively with the mean values of 14.57, 20.10 and 18.31 per cent. Rawat *et al.* (1994) also observed increase in protein content while preparing chapattis. Later on, Beatrice *et al.* (1998) also observed increase in protein content of extruded products. Maximum values were obtained in defatted soy spaghetti since defatted soy flour contains high protein due to removal of fat. Increase in protein content with germination has also been reported by Chandrasiri *et al.* (1987). A significant increase was also observed in the sub treatments.

Crude fibre

The data in tables 2, 3 and 4 showed the crude fibre content of fullfated soy spaghetti ranging from 2.65-3.08 with mean value of 2.86; defatted soy spaghetti ranging from 2.89-3.86 with mean of 3.40 and germinated soy spaghetti ranging from 3.23-4.74 with mean of 4.04 per cent respectively. All treatments and sub treatments varied significantly with regard to this important constituent. Significant increase were observed both with the addition of soy flours and bael pulp in all the treatments. When the treatments are individually compared, improved crude fibre content was observed both in defatted and germinated soy samples. This increase can be attributed to the decrease in fat content of both the corresponding soy flours, thus improving the fibre content. Sharma (2002) also observed improvements in crude fibre content of maize-defatted soy supplemented products. Whereas, improvements observed due to germination has also been reported by Bark and Gawish (1990). Further Giami (1993) reported that germination resulted in an increase in crude fibre content by 4.76 per cent.

Conclusion

The present study indicates that spaghetti prepared alone with whole wheat flour contained far less ash, protein, fat and fibre than that prepared along with fullfated, defatted and germinated soy flour accompanied by bael pulp. This shows that soy flours can successfully be incorporated to make highly nutritious products, which can overcome the functional needs of the body. Among the three flours defatted soy flour can prove to be highly nutritive and functional since it contains much protein required for the catabolic reactions taking place at old age and its fibre content that can improve the bowel functioning, lower cholesterol and control diabetes. Removal of fat can be beneficial for the persons suffering from diabetes and cardiac diseases.

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