PRINT: ISSN 0970-9274 ONLINE: 2456-6608
J. Hum. Ecol., 14(6): 467-469 (2003)
DOI: 10.31901/24566608.2003/14.06.09

Nutritional and Organoleptic Evaluation of Colocasia Leaf Rolls Supplemented with Different Protein Sources

Poonam Singh and H.R. Sharma

INTRODUCTION

Fresh vegetables form an important and essential component of human diet. Nutritionally their protein contents and calorific values are lower than those of cereals, pulses and oilseeds. (Aykroyd et al., 1996). Vegetables, however, constitute important sources of carotenes, minerals and dietary fibre (Salunkhe and Desai,1984).

Colocasia *(C. esculenta)* a member of family *aracea* is the major and popular vegetable among the arum family due to its peculiar flavor and taste. It is widely grown and used as vegetable in India to offer a supplementary potential source of calories, vitamins and minerals (CSIR, 1950). The verstality of this plant is reflected by the fact that not only the tubers but also the leaves and petioles are used as vegetable in Himachal Pradesh. The people of Himachal Pradesh consume the leaves traditionally in the form of leaf rolls (*patroraas)*. The leaf rolls are generally prepared with rice and maize flours. An attempt was made to improve the nutritional quality of the leaf rolls by making use of high protein legumes such as Soybean, Blackgram and Bengalgram in the preparation of colocasia leaf rolls.

MATERIAL AND METHODS

Fresh and moderate sized leaves of colocasia were procured from the field and washed thoroughly. Pastes (l00g) containing either pure (rice, maize, soybean, Blackgram and Bengalgram) or variable proportions (50% soybean + 50% either rice or maize or black gram or Bengal gram) of cereals and legumes were prepared by mixing rice or maize flours in water, and by soaking the legumes in water (1:3) overnight, followed by wet grinding. Spices i.e., turmeric (2.0 g), salt (5.0 g), garam masala (15 g) and oil (15 m1) were added to the pastes and mixed thoroughly, and a thick and smooth batter was prepared. Fresh colocasia leaves (75 g) were taken. A leaf was spreaded on a plain surface in such a way so that underside came up and the paste was smeared uniformly over the entire surface of leaf, then another leaf was taken, spreaded and placed over the smeared leaf and smeared /coated similarly. About l00 g of paste was applied over 75g of leaves by placing the leaves one above another. The smeared leaves were rolled into a leaf roll and roll was tied with a thread. The tied rolls were steamed in an open cooker containing water by placing the rolls over a perforated sieve. Steaming was continued at a low flame for about 25 minutes or until the rolls became soft. After cooling, the smeared leaf rolls were taken out and cut into slices and slices were shallow fried in oil till crisp. The fried slices were subjected to acceptability test by a panel of 10 judges on a nine point hedonic scale, and were evaluated for proximate composition (AOAC, 1990). Total carbohydrates were determined by difference method by subtracting from 100, the sum of values of crude protein, crude fat and ash. Neutral detergent fibre (NDF) and Acid detergent fibre (ADF) contents of the samples were also determined (Van Soest, 1963). Non-fibre carbohydrates were determined by subtracting NDF from the total carbohydrates and the available energy was calculated by multiplying the percent protein, fat and non-fibre carbohydrates by 4, 9 and 4 and summing up the values. The mineral contents were determined according to Piper (1966).The data were analysed statistically according to Gomez and Gomez (1984) and the results are expressed on dry matter weight basis.

RESULTS AND DISCUSSION

The chemical composition of leaf rolls prepared by smearing the colocasia leaves with rice, maize, Bengalgram, Blackgram and by combining these with soybean in equal proportion (50:50) is given in Table 1. The protein content among different treatments varied from 4.09 to 23.36 per cent. The leaf rolls prepared with rice and maize contained significantly lower contents of protein (4.09 and 6.58%) than the protein contents of

Table 1: Chemical composition of leaf rolls *(Patroraas)* stuffed with different and in combination with different protein sources

Protein Sources	*Crude protein (%)*	*Crude fat (%)*	*NFC (%)*	*Total carbohydrates (%)*	*Ash (%)*	*Crude fibre (%)*	*Available energy (Kcal) (%)*
Rice	4.09	20.83	63.74	73.13	1.95	2.41	459
Maize	6.58	22.47	56.44	68.45	2.50	3.56	454
Bengalgram	12.86	22.94	49.62	61.34	2.86	3.23	456
Blackgram	14.33	21.03	48.84	61.52	3.12	3.17	442
Soybean	23.36	30.13	25.38	42.65	3.86	3.79	466
Rice+Soybean (1:1)	13.73	25.79	44.34	57.67	2.81	3.15	464
Maize + Soybean (1:1)	14.97	26.61	40.59	55.24	3.18	3.68	462
Bengalgram + Soybean (1:1)	18.11	26.73	37.30	51.80	3.36	3.51	462
Blackgram + Soybean (1:1)	18.85	25.89	36.79	51.77	3.49	3.48	458
CD ($P \leq 0.05$)	1.25	1.37	0.12	2.18	0.49	0.65	0.02

* Data presented are the averages of two determinations.
*NFC= Non- fibre Carbohydrates.

leaf rolls prepared with Bengalgram (12.6%), Blackgram (14.33%) and Soybean (23.36%). Addition of soybean (50%) to rice, maize, Bengalgram and Blackgram and utilizing the resultant batter in the preparation of leaf rolls resulted in an improvement in the protein contents of the leaf rolls and the protein content among soybean supplemented leaf rolls varied from 13.73 to 18.85%. The crude fat contents among different leaf roll preparations varied from 20.83 to 25.89%. The fat contents in soybean based leaf rolls are observed to be significantly higher than those of un-supplemented leaf rolls. The high fat content in leaf rolls is attributable to the oil used in the frying of leaf roll slices and high content of oil in soybean. The rice and maize based leaf rolls contained higher contents of digestible carbohydrates (63.74 and 56.44%), whereas, legume based leaf rolls contained comparatively lower amount of carbohydrates (25.38 to 49.62%). Ash and crude fibre values among different leaf roll preparation varied from 1.95 to 3.86% and 2.41 to 3.79% respectively. The available energy contents varied from 442 to 466 Kcal/100g among different preparations. The preparations containing high contents of fat were rich in available energy. The analysis of leaf rolls for fiber and mineral constituents revealed that leaf rolls

Table 2: Fibre and mineral composition of leaf rolls *(Patroraas)* stuffed with different and in combination with different protein sources

Protein sources	*NDF (%)*	*ADF (%)*	*Hemicellulose (%)*	*Ca (mg/100g)*	*Fe (mg/100g)*	*Zn (mg/100g)*
Rice	9.39	3.84	5.55	131.06	2.65	0.78
Maize	12.01	4.02	7.99	132.06	3.39	0.31
Bengalgram	11.72	7.26	4.46	152.81	4.84	0.64
Blackgram	12.68	4.91	7.77	153.41	3.92	1.03
Soybean	17.27	8.87	8.40	211.20	7.01	1.07
Rice + Soybean (1:1)	13.33	6.36	6.97	167.93	4.84	0.88
Maize + Soybean (1:1)	14.65	6.45	8.20	168.79	5.21	0.68
Bengalgram + Soybean (1:1)	14.50	8.07	6.43	189.45	5.93	0.85
Blackgram + Soybean (1:1)	14.98	6.89	8.09	196.62	5.47	1.04
CD ($P \leq 0.05$)	0.08	0.12	0.50	0.23	0.08	0.02

*NDF = Neutral detergent fibre.
*ADF = Acid detergent fibre.
*Data presented are the averages of two determinations.

Table 3: Organoleptic acceptability scores (1-9) of Leaf rolls (Patroraas) stuffed with different and in combination with different protein sources.

Protein source	*Colour*	*Taste/ flavour*	*Texture*	*Acridity*	*Overall acceptability*
Rice	5.6	5.4	5.3	8.0	6.08
Maize	6.4	5.2	5.2	7.9	6.17
Bengalgram	8.2	8.0	7.8	8.6	8.15
Blackgram	7.0	7.4	7.2	8.1	7.43
Soybean	7.6	6.6	7.4	7.7	7.32
Rice + Soybean (1:1)	7.1	7.4	7.0	8.2	7.43
Maize + Soybean (1:1)	7.0	6.6	7.2	8.0	7.20
Bengalgram + Soybean (1:1)	8.0	7.6	7.6	8.0	7.80
Blackgram + Soybean (1:1)	7.6	7.2	6.4	7.9	7.28
CD ($P \leq 0.05$)	1.38	1.79	1.47	NS	1.45

NS =Nonsignificant

prepared with legumes were rich in NDF (11.72 to 14.98%), and ADF (6.36 to 8.07%) as compared to NDF (9.39 to 12.01%) and ADF (3.84 to 4.02%) of rice and maize based leaf rolls (Table 2). The addition of soybean to rice, maize, Bengalgram and Black-gram increased both NDF and ADF contents of leaf rolls. Supplementation of rice, maize Bengal-gram and Blackgram with soybean also enhanced the calcium and iron contents of leaf rolls. The leaf rolls prepared with legumes were more acceptable by the judges as compared to the leaf rolls prepared with cereals (Table 3). The supple-mentation of rice and maize with soybean impro-ved organoleptic acceptability of rice and maize based leaf rolls. In conclusion it can be said that nutritious leaf rolls can be prepared by using legumes batter as a smearing medium in the preparation of acceptable quality leaf rolls. The soybean seems to have a potential as it is cheaper than other legumes and richest source of protein among different legumes. Apart from protein it can also enhance the fibre and mineral values of the supplemented products. It is to be mentioned here that agro-climatic conditions of Himachal Pradesh are quite favorable for soybean cultivation and the development of technology for its utilization in the traditional foods, can boost the production of this nutritionally high valued legume.

KEY WORDS Colocasia Leaf Rolls. Carbohydrates. Neutral Detergent Fibre. Acid Detergent Fibre . Organoleptic Evaluation.

ABSTRACT *Colocasia esculenta* is a popular vegetable among arum family. The leaves of this plant are traditionally consumed in Himachal Pradesh in the form of leafs rolls (*patroraas*). Traditionally, the leaf rolls are prepared with cereal flours such as maize and rice. As these cereals are poor in quality and quantity protein, an attempt was made to supplement the colocasia leaf rolls with different protein sources such as Soybean, Black gram and Bengal gram to improve the product nutritionally. Results suggested that rolls prepared with legumes were nutritionally and organoleptically superior to the rolls prepared with cereals .

REFERENCES

AOAC.: *Official Methods of Analysis Association of Official Analytical Chemists.* 15th Edition, Washington, D.C. (1990).

Aykroyd, W.R., Gopalan, C. and Balasubramaniam, S.C.: The Nutritive Value of Indian Foods and Planning of Satisfactory Diets. *Spec. Rep. Ser. 42,* ICMR, New Delhi (1996).

CSIR.: *Wealth of India (Raw Materials).* Council of Scientific and Industrial Research, New Delhi, **2**: 311 (1950).

Gomez, K. A. and Gomez, A. A.: *Statistical Procedures for Agricultural Research.* Willey International John Willey and Sons, New York (1984).

Piper, C.S.: *Soil and Plant Analysis.* Hans Publishers, Bombay, Pp 223-227 (1966).

Salunkhe, D.K. and Desai, B.: *Post-harvest Biotechnology of Vegetables.* Vol.1, CRC Press. Inc., Florida (1984).

Van Soest, P.J.: Use of detergents in analysis of fibrousfeeds. 11. A rapid method for determination of fibre and lignin. *J. Assoc. Off. Anal. Chem.,* **46**: 829-835 (1963).

Authors' Address: **Poonam Singh and H.R. Sharma,** Department of Food Science and Nutrition, College of Home Science, CSK HP Krishi Vishvavidyalaya, Palampur 176 062, Himachal Pradesh, India