Utilization of dehydrated curry leaves in different food products

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Received 22 November 2010; Accepted 24 May 2011

Curry leaves are a popular leaf-spice used in very small quantities for their distinct aroma due to the presence of volatile oil and their ability to improve digestion. The present study was carried out to analyze the chemical composition of dehydrated curry leaves and to prepare different products by the incorporation of these leaves. Organoleptic and nutritive values of the prepared products were analyzed. Organoleptic evaluation was carried out using the nine point hedonic scale and nutritional composition was calculated using the food composition table. On the basis of findings, it was observed that calcium, iron, β-carotene content in prepared products increased significantly as the incorporation levels increased. Thus dehydrated curry leaves can be incorporated in the preparation of different food products to improve their nutrient contents.

Keywords: Curry leaves, Food products, Leaf spice, Murraya koenigii.

IPC code; Int. cl. (2011.01) — A23L 1/00, A23L 1/052, A23L 1/221

Introduction
Curry leaves are the sweet smelling leaves of small tree, Murraya koenigii (Linn.) Spreng. of Rutaceae family native to South-west Asia. It is also known as: Barsunga in Bengali, Kari patta, meetha neem, Katneem, etc. in Hindi, Karivepaku in Telugu, Karuvelpilai in Tamil, Bowala in Punjabi, Kadhi limbu in Marathi, Karibile in Kannada, etc. The leaves are a good source of vitamin A and they provide a rich source of calcium. It is a perennial leaf vegetable and primarily used in providing a flavour in the Indian cooking. Curry leaves are mainly used for cooking in the southern parts of India in order to provide flavour to the curries, vegetables, pickles, chutneys, soups, butter milk, south Indian sambar preparation as well as non-vegetarian items, however, mainly used in vegetarians’ food. They add to the smell and taste of food in addition to the food value. The leaves retain their flavour after drying and hence these are marketed both in fresh and dried forms. There is not much loss of volatile oil during drying either is sun/shade or in cross flow dryer. Oven drying at 50°C is recommended as the best technology for conversion of fresh leaves into dry powder. Higher temperatures during drying deteriorated powder quality. Fresh leaves on steam distillation under pressure (90 lb/in²) yield 2.6% of a volatile oil. The present study was conducted with the objectives to analyze the chemical composition of dehydrated curry leaves to prepare different food products using different incorporation levels of dehydrated curry leaves, to assess the organoleptic properties of the prepared products and to calculate the nutritive value of the prepared products.

Materials and Methods

Procurement of raw materials
Fresh curry leaves were collected from the local area and the other ingredients required for product formation were purchased from local market of Allahabad.

Control and treatments to products
The basic recipe was standardized and served as control (T₀). Three value addition treatments i.e. by incorporating dehydrated curry leaves at 3, 4 and 5% levels were referred to as T₁, T₂ and T₃ treatments, respectively for each of the four products developed. Ten samples ranging from 1-10% incorporation of dehydrated curry leaves were used in the preparation of various products and the best three levels were determined on the basis of organoleptic acceptability of the products by the panel of judges.

Chemical analysis of dehydrated curry leaves
The nutrient composition i.e. moisture, ash, fat, protein, iron and calcium of dehydrated leaves were estimated by chemical analysis using standardized procedure of AOAC (Ref. 3), carbohydrate was calculated by difference method. β-Carotene content of the curry leaf was estimated using the method prescribed by Jensens (Ref. 4).
Organoleptic analysis of the prepared products

The products mathri, idli, uttapam and lemon rice were freshly prepared and evaluated organoleptically by a panel of judges. The products were judged for various attributes such as flavour and taste, body and texture, colour and appearance and overall acceptability with the help of nine point Hedonic scale. The mean scores for each product and each treatment were then calculated.  

Calculation of nutritive value of prepared product

For calculating nutrients of prepared products, the analysed value of nutrients of dehydrated curry leaves was taken. However, for the other ingredients the values given by Gopalan et al. in the food composition table were used. The moisture, ash, fat, protein, carbohydrate, energy, iron, calcium and β-carotene of the products were calculated by using the values obtained from raw ingredients.

Statistical analysis

The data obtained were statistically analyzed by using analysis of variance techniques (ANOVA) and CD (Critical difference) technique.

Results and Discussion

Chemical composition of dehydrated curry leaves

The moisture, ash, carbohydrate, fat, protein, iron, calcium, and β-carotene in dehydrated curry leaves per 100g was 6.98, 9.7, 65.42, 5.4, 12.5g, 12, 2040 mg, and 5292 µg, respectively. Comparative analysis of nutrient content of fresh and dehydrated curry leaves is given in Table 1. All the nutrient contents of dehydrated curry leaves increased significantly except β-carotene which decreased significantly from 7560 to 5292 µg/100g.

Organoleptic characteristics of the prepared products

The data illustrated in the Table 2 pertaining to the average sensory scores of different parameters in control and treated sample of uttapam incorporated with dehydrated curry leaves and lemon rice.
dehydrated curry leaves, clearly indicates that T₂ had the highest score for colour and appearance (8.2), body and texture (8.48), taste and flavour (8.48), and overall acceptability (8.52).

The average sensory scores of different parameters in control treated sample of mathri incorporated with dehydrated curry leaves (Table 2), clearly indicates that T₂ had the highest score for colour and appearance (8.28), body and texture (8.48), taste and flavour (8.48), and overall acceptability (8.3).

The average sensory scores of different parameters in control treated sample of idli incorporated with dehydrated curry leaves (Table 2), clearly indicates that T₂ had the highest score for colour and appearance (8.6), body and texture (8.52), taste and flavour (8.52), and overall acceptability (8.51).

The average sensory scores of different parameters in control treated sample of lemon rice incorporated with dehydrated curry leaves (Table 2), clearly indicates that T₁ had the highest score for colour and appearance (7.72), body and texture (7.9), taste and flavour (8.08), and overall acceptability (7.2).

Organoleptically it was found that in the case of uttapam and lemon rice, 3% incorporation of dehydrated curry leaves (T₁) scored best. In case of mathri and idli, 4% incorporation of dehydrated curry leaves (T₂) scored best with regard to colour and appearance, body and texture, taste and flavour, and overall acceptability.

**Nutritional composition of formulated products**

Nutritive value of prepared product namely mathri, uttapam, idli and lemon rice (Table 3) incorporated with dehydrated curry leaves as β-carotene, calcium and iron were increased in the prepared product as compared to control.

Similar finding was also reported by Shanthala and Prakash⁸ the acceptability of curry leaves incorporated product and attitude toward consumption possibility of incorporation dried curry leaf powder at 5 or 10% level of common dishes to increase the intake of green as a source of micronutrients. Thus, the curry leaf powder can be incorporated in spice mixture to add flavour, colour, taste and health benefits to many vegetables and rice dishes.

**Conclusion**

On the basis of findings, it can be concluded that the dehydrated curry leaves can be successfully incorporated in various products which are beneficial to health. The incorporation of levels of curry leaves increased the value of iron, calcium and β-carotene in all the four products.

**References**


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