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## Organoleptic evaluation and proximate composition of products from chickpea leaves and other leaves: Review

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### Abstract

Chickpea (*Cicer arietinum* L.) is an important pulse crop grown and consumed all over the world, especially in the Afro-Asian countries. It is a good source of carbohydrates and protein, and the protein quality is considered to be better than other pulses. Chickpea has significant amounts of all the essential amino acids. Natural oxidants have gained considerable interest in recent years for their role in preventing the auto oxidation of fats, oils and fat containing food products. In the present study, three plant foods viz, amla (*Emblicao officianalis*), drumstick leaves (*Moringa oleifera*) and raisins (*Vitis vinifera*) were used as sources of natural antioxidants. All the three extracts exhibited a high percentage of antioxidant activity which was evaluated using beta-carotene-lenoleic acid *in vitro* system, compared to synthetic antioxidants. It had been studied that the antinutrients contents of different products viz. soup, vegetable, *raita*, *parotha*, *pakora* and cutlet prepared by incorporating *chaulai*. The oxalic content of these products was 3.65, 5.13, 1.37, 1.46, 0.49, and 0.64 g / 100 g, respectively. The phytic acid content of soup was 199.0 mg/100 g, vegetable (169.07 mg / 100 g), *raita* (41.07 mg / 100 g), *parotha* (201.77 mg / 100 g), *pakora* (109.31 mg / 100 g) and cutlet (86.89 mg / 100 g) prepared by incorporating *chaulai*. The polyphenol content of these products were 18.92, 22.25, 3.13, 13.83, 15.75 and 15.04 mg tannic acid equivalent/g.

**Keywords:** Antioxidants, Oxalic content, Phytic acid, Antinutrients

### Introduction

#### Organoleptic evaluation of chickpea leaves and other leaves products

Chickpea (*Cicerarietinum* L.) is an important pulse crop grown and consumed all over the world, especially in the Afro-Asian countries. It is a good source of carbohydrates and protein, and the protein quality is considered to be better than other pulses. Chickpea has significant amounts of all the essential amino acids.

Kaveri *et al.* (2004) <sup>[10]</sup> incorporated fresh (15.0 and 20.0%) and dehydrated (5.0 to 10.0%) *shepu* (*Peucedanum graveolens*) and *kilkeerae* (*Amaranthus tricolor*) in wheat based *papads*. The fired *papads* were subjected to sensory analysis by a panel of 100 members. *Papads* with 15.0-20.0 percent fresh greens and 5.0 percent dehydrated greens scored above 6 on a scale of 10 indicating acceptability of *papads* incorporated with greens. Natural oxidants have gained considerable interest in recent years for their role in preventing the auto oxidation of fats, oils and fat containing food products. In the present study, three plant foods viz, amla (*Emblicao officianalis*), drumstick leaves (*Moringa oleifera*) and raisins (*Vitis vinifera*) were used as sources of natural antioxidants. All the three extracts exhibited a high percentage of antioxidant activity which was evaluated using beta-carotene-lenoleic acid *in vitro* system, compared to synthetic antioxidants. Biscuits prepared by addition of natural extracts were subjected to sensory studies and chemical analysis. Biscuits treated with natural antioxidants, extracted from raisins (B4) and drumstick leaves (B5) received higher ( $p \leq 0.05$ ) panel scores during storage period of 6 weeks, than control (B1), butylated hydroxyl anisole (BHA) (B2) and amla (B3) extract incorporated biscuits (Reddy *et al.*, 2005).<sup>[14]</sup>

Kaur and Kochar (2005) <sup>[9]</sup> carried out a study on organoleptic evaluation of preparation using underexploited greens (greens of cauliflower; radish, turnip and carrot). To evaluate the products for sensory attributes Hopkin's seven point scale was used. The study revealed that the most acceptable level for *prantha* with radish and cauliflower greens was 30 percent whereas; in case of carrot and turnip greens it was 50 percent. The respective scores for overall acceptability ranged from 5.42 (cauliflower greens) to 6.02 (radish greens). *Bhujji* prepared by using cauliflower greens scored highest (6.08). *Poori* prepared by incorporating cauliflower and radish leaves at 40 percent was best acceptable with scores of 5.42 and 6.3 respectively.

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### Proximate composition of products from chickpea and other leaves:

Composition of *sag* prepared by blending different varieties of mustard leaves were analyzed by Kalra *et al.* (1990). They reported that moisture content ranged from 82.0 to 84.7 percent, protein 10.9 to 17.5 percent, fat 33.0 to 34.9 percent, crude fibre 9.4 to 12.5 percent and total ash 14.4 to 19.5 percent, respectively.

Kaveri *et al.* (2004) <sup>[10]</sup> incorporated fresh (15.0 and 20.0%) and dehydrated (5.0 to 10.0%) shepu (*Peucedanum graveolens*) and kilkeerae (*Amaranthus tricolor*) in wheat based *papads*. The fired *papads* were subjected to sensory analysis by a panel of 100 members. Fibre content of greens incorporated *papads* increased remarkably. The vitamin content of greens incorporated *papads* increased remarkably.

Yadav (1992) studied the antinutrients contents of different products viz. soup, vegetable, *raita*, *parotha*, *pakora* and cutlet prepared by incorporating *chaulai*. The oxalic content of these products was 3.65, 5.13, 1.37, 1.46, 0.49, and 0.64 g / 100 g, respectively. The phytic acid content of soup was 199.0 mg/100 g, vegetable (169.07 mg / 100 g), *raita* (41.07 mg / 100 g), *parotha* (201.77 mg / 100 g), *pakora* (109.31 mg / 100 g) and cutlet (86.89 mg / 100 g) prepared by incorporating *chaulai*. The polyphenol content of these products were 18.92, 22.25, 3.13, 13.83, 15.75 and 15.04 mg tannic acid equivalent/g.

Luthra and Sadana (1995) prepared '*sags*' individually and by combining green leafy vegetables like *bathua sag*, *bathua* + spinach *sag*, carrot leaves *sag*, redish leaves *sag*, redish + spinach *sag*. Cooked '*sag*' contained calcium, iron and phosphorus in range of 246 to 840, 22.0 to 76.4 and 82 to 118 mg per 100 g, respectively.

Kaveri *et al.* (2004) <sup>[10]</sup> incorporated fresh (15.0 and 20.0%) and dehydrated (5.0 to 10.0%) shepu (*Peucedanum graveolens*) and kilkeerae (*Amaranthus tricolor*) in wheat based *papads*. The fired *papads* were subjected to sensory analysis by a panel of 100 members. Mineral content of greens incorporated *papads* increased remarkably.

The acceptability of products with cauliflower leaves was carried out by Kowsalya and Mohandas (1999). <sup>[11]</sup> The study revealed that cauliflower leaves were used in the common south Indian preparations such as, *poriyal* and *kootu*. The drumstick leaves *poriyal* and *kootu* were used as standard for comparison. Identical scores were obtained for both standard and test *poriyal* with respect to appearance (4), color (4), and texture (3.8) on four point numerical rating scale. The higher total score was obtained for cauliflower leaf *poriyal* (19.8) with 90 percent of panel members opting it. Standard and test *kootu* was equally acceptable for appearance and colour (4) but the total score was highest for drumstick leaves *kootu* (19.6).

Lakshmi and Vimala (2000) dehydrated amaranth, curry leaves, *gogu* and mint leaves to prepare powders for incorporation in different products which were evaluated by panel of trained judges. The food products prepared using powders of amaranth (soup, *dhal* with greens and *pesarattu*), curry leaves (hot powder, *pakodi* and *pesarattu*), *gogu* (*dhal* with greens, *chutney* and mutton curry) and mint (vegetable *biryani*, *chutney* and bone soup) were rated as highly acceptable for all the sensory attributes and were scored from good (4) to excellent (5) on five point scale. However, soup with amaranth powder received slightly lower scores of 3.8 for overall acceptability, taste and flavour.

Dahiya (2004) <sup>[3]</sup> observed that *matthis* supplemented with

mothbean, spinach and fenugreek were 'moderately desirable' by the panel of ten judges for their colour, appearance, flavor, texture and taste when prepared fresh. Value added traditional products of Bangalore were acceptable with scores of 4.2 (*upma* and *dosa*) 4.1 (*majjigehuli*, *ambode* and *ladoo*) to 3.9 (*Bisebele bhath*) on five point scale in a study conducted at Bangalore (Anonymous, 2003). <sup>[2]</sup> Report from Hisar indicated that value added products (VAPs) with underutilized leafy vegetables, fruits and other vegetables were highly acceptable with scores of more than 7.0 on nine point hedonic scale (Anonymous, 2003).<sup>[2]</sup>

The products, viz., bread, biscuit, noodles and macaroni prepared from the wheat fenugreek blends at 10, 15 and 20% levels, were found organoleptically acceptable (Hooda and Jood, 2004). The incorporation of fresh (15.0 and 20.0%) and dehydrated (5.0 to 10.0%) shepu (*Peucedanum graveolens*) and kilkeerae (*Amaranthus tricolor*) in wheat based *papads* resulted into the suitability of *papads* incorporated with green in terms of sensory and nutritional quality (Kaveri *et al.*, 2004).<sup>[10]</sup>

In another study Shanthala and Prakash (2005) <sup>[15]</sup> explored the possibility of incorporating dried curry leaf powder (CLP) at 5 or 10% level of common dishes to increase the intake of greens as a source of micronutrients. Dried CLP was incorporated into *chapati* (unleavened Indian bread), seasoned potatoes and in cooked rice as a part of spice mixture and the acceptability was evaluated by 53 panel members. The addition of CLP affected the color and appearance of the products. At the lower level (5%) of incorporation, the texture, odour and taste of *chapati* were not affected. The spice mixture with CLP was highly accepted by the panel members.

Karva *et al.* (2010) <sup>[8]</sup> also reported the overall acceptability of *chapati* and *thalipattu* with rehydrated *rajagi* leaves was found extremely well (8). Verma and Jain (2012) <sup>[17]</sup> estimated fortifications of *mathri* with fresh and dehydrated vegetables and assessment of nutritional quality. Levels of incorporation of fresh greens (spinach, mint and carrot) in *mathri* were 8 percent, whereas, powder of the dry green vegetables (spinach, mint, carrot and lotus stem) was added in *mathri* at 7 percent. Results showed that the fresh vegetables *mathri* had the highest overall acceptability (7.8 ± 0.199) attributes and the score fell in the range of 'like very much'.

The dark green colour of spinach changes to olive green on thermal processing mainly due to conversion of chlorophyll into pheophytin and pyropheophytin. The process of chlorophyll degradation was found to be slow at lower temperatures (Ankita and Prasad, 2013).<sup>[1]</sup>

Singh and Grover (2014) <sup>[16]</sup> reported that the overall acceptability of value added *Poori* with dehydrated chickpea leaves powder was found in the range of 6.42 to 8.44. The overall acceptability of value added *Chapati* with dehydrated leaves powder was found in between 8.4 at 7.5 percent level which was observed as very good.

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