

PJN

ISSN 1680-5194

PAKISTAN JOURNAL OF
NUTRITION

ANSI*net*

308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

Acceptability Studies of Value Added Products with Purslane (*Portulaca oleracea*)

S. Tarkergari¹, K. Waghray² and S. Gulla²

¹BHEL General Hospital, Ramachandrapuram, Hyderabad, Andhra Pradesh, India

²Food Technology, University College of Technology, Osmania University, Hyderabad, Andhra Pradesh, India

Abstract: Acceptable, nutritive products were prepared using Purslane (*Portulaca oleracea*) to explore the possibility of utilizing fresh and dehydrated leaves and stalk in common dishes to increase the intake of greens as a source of micro and macro nutrients. Ten food products were developed and standardized out of which 6 were with the dehydrated powder 4 were with dhal and vegetable combinations. Spinach was used as a control. The nutrient content of the prepared recipes especially with reference to dietary fibre, protein, calcium and iron were higher than the control. Significant differences were observed in a few of the recipes in regard with the sensory attributes (Appearance, flavor, taste and overall acceptability) of portulaca oleracea recipes with that of control.

Key words: Purslane, *Portulaca oleracea*, recipes, nutrients, sensory evaluation

INTRODUCTION

Portulaca oleracea (Purslane) is believed to be the earliest vegetable consumed by human (Susiarti, 1993). It can be eaten raw (dipped in salty fish sauce or mixed into salad), or cooked (Solomon, 1998). It is consumed in many different parts of the world such as China, India, Middle East, South East Asia, Netherlands, Mexico and United states (Ohio and Kentucky). According to Mohamed and Hussein (1994) in Middle East, purslane can be consumed raw as salad or soups. The seeds may be ground into flour as ingredient in mush bread. The Greece mix raw purslane with sliced potatoes, tomatoes, onions, green chillies, parsley, olive oil, vinegar and salt into tomato, potato and purslane salad (Kochilas, 2001). The Dutch make it into soup called sop selam korkot. The soup is made of local celery, local leek, citrus, sweet soy sauce. According to Heyne (1950), this plant was a favourite *lalab* in Java. It might be cooked with tamarind. In central Java, purslane leaves and young stem used to be stirred and fried with sliced shallot, garlic, red chillies, palm sugar, salt, salam leaves and a slice of alpinia galangal (lengkuas) to make cuisine called oseng-oseng. It may also be boiled or steamed and then served with other vegetable (local spinach, mung bean sprout, long bean, Marsilea crenata, etc) and poured with peanut sauce to make cuisine called pecel.

The Chinese stir and fry this vegetable with garlic, sesame oil and light soy sauce (Solomon, 1998). In Sri Lanka, purslane is also stirred and fried with Maldivian fish, garlic, leek, chilli powder and lemon juice (Solomon, 1998). In United States, purslane is cooked into casserole, pickle, pancakes and Lamb's quarter

and purslane salad. In Mexico purslane is a favourite snack food. It is rolled in an omelet, rolled in tortillas, or added into soups and stews, (Anonymous, 1998a,b). The French mix it with sorrel and make it into French soup, *bonne femme*. Other kind of western soup is purslane and pea soups. Western salad may consist of purslane, lettuce, chervil, borage flowers and marigold petals, borage and mint (Hernando and Leon, 1994). 5% and 10% freeze dried purslane were incorporated into high protein vegetable patties and was seen that they had a good mineral profile with low sodium content (Dawkins and Ward, 2010).

Nowadays, consumers have increased for consuming high amounts of safe and ready to use products but with high sensory attributes, nutritional and health qualities of foods. The food should be nutritious, attractive in flavor and appearance, to be eaten and enjoyed (Pandey *et al.*, 2006). Acceptable, nutritive products were developed using Purslane (*Portulaca oleracea*) which can be consumed fresh as a salad, or cooked like spinach and because of its mucilaginous quality it is also suitable for soups and stews. Each region has its own traditional food habits and in South India it is mostly used in lentil soups and curries. Hence with this idea and using Spinach as control and on the basis of survey, a total of 10 recipes which are traditionally prepared and consumed daily by higher proportion of the population were selected for value addition.

MATERIALS AND METHODS

The purslane leaves were procured from local market in BHEL, Hyderabad. The leaves were thoroughly washed and blanched with 2% Sodium Chloride and 0.5%

Magnesium Oxide. The blanched leaves were dried and ground to a fine powder for incorporation into the recipes. The level of incorporation was determined based on the recipe. 30 g of fresh (sautéed or unsautéed) or 15 g of dehydrated and powdered Purslane (*Portulaca oleracea*) were incorporated in the selected/chosen recipes. Out of ten recipes developed, three were breakfast items (pulihora, uttappam and missi roti) greens with red gram dhal (*Cajanus cajan*) and Bengal gram dal (*Cicer arietenum*), greens curry, paneer with greens, groundnut chutney with leaf powder and two snack items (pakoda, vada) were standardized under greens, dals and other combinations. Garlic, cumin seeds, green and red chillies, onion, curry leaves, were used as minor ingredients and also in the seasoning of the recipes. Salt was added to taste and lemon juice was added to taste as a souring agent. The same recipes were also prepared with spinach incorporation as control to compare the recipes nutritional enhancement and were checked for their nutritional profile and sensory evaluation in comparison with control.

Sensory evaluation using a 5-point Hedonic scale was followed, where 5 was excellent and 1 extremely poor. The 20 panelists judged the samples for perceivable sensory attributes like appearance, taste, flavor and overall acceptability (Ranganna, 1992). The panel members were given the controls first, followed by the test recipe. The sensory evaluation of the recipe along with control was conducted on the same day. Nutritive values per serving (50 gms) of the prepared ten recipes were calculated using Food composition tables for Indians (Gopalan *et al.*, 2004) and compared with recipes prepared with control.

All results were expressed as mean±SD and were analyzed by SPSS for Windows, version 16.0 (SPSS Inc, Chicago). The means and SD tabulated was subjected to analysis of variance, tests of significance to know the difference in the acceptance of recipes with that of control.

RESULTS AND DISCUSSION

Green leafy vegetable pakoda are generally prepared with varieties of pulses and green gram, either whole or

split and red gram dhal being the most common pulse used in routine diets of people in this region, the three pulses were included in the study. Breakfast cereals like vada and uttappam are prepared with black gram dhal, hence also included. Vijayalakshmi and Devadas (1994) carried out a study on enhancing the nutritive value of convenience foods by incorporating green leafy vegetables and the addition of coriander and curry leaves which increased the nutritive value with respect to protein, β -carotene, calcium and iron. So in the same way it was observed that the protein, fat, fiber, carbohydrate, energy, calcium, β -carotene and iron contents with control varied for the 10 different recipes prepared.

Fibre and iron content doubled with value addition in most of the recipes in comparison to control ranging from 2.4 g/50 g - 3.56 g/50 g. Protein, carbohydrate and calcium contents of the value added recipes were seen to be almost similar to recipes made with control whereas β -carotene deteriorated by three fold, the decrease ranging from 702-720 μ g/50 g of the serving. Missi roti and Pakoda with greens contained highest energy per serving while Paneer curry with greens had maximum calcium. Similarly protein, iron and β -carotene contents of selected vegetable preparations were evaluated by Nalwade and others (2005). Underutilized leafy vegetables namely anjeer greens and knolkhol leaves were incorporated at 20-50% in 10 traditional routinely consumed products of Bangalore for iron security (Anonymous, 2003). Dawkins and Ward (2010) studied that high protein vegetable patties containing two levels of purslane had a good mineral profile with low sodium content. Also the amino acid profile is comparable to the USDA requirements for unprepared vegetable burgers. Incorporation of purslane into formulated daily diet makes purslane/ powder an ingredient of potentially high priority for health conscious consumer.

Sensory evaluation of recipes prepared with purslane (*Portulaca oleracea*): Appearance, flavor and taste scores for cooked recipes containing purslane were not significantly different when compared to the control in Bengal gram dhal curry, greens curry, Missi roti, green

Table 1: Nutrient calculation of the recipes prepared with Purslane (*Portulaca oleracea*) and with control in different recipes most commonly consumed in South India (50 g serving)

Name of the recipe	Protein (g)	Fat (g)	Fiber (g)	Carbohydrate (g)	Energy (kcal)	Calcium (mg)	β -carotene (μ g)	Iron (mg)
RGD with purslane leaves	4.80 (4.2)	2.50 (2.9)	2.50 (1.40)	9.00 (12.0)	51.10 (061.3)	44.50 (42.6)	707.40 (2174.0)	12.00 (0.7)
BGD with purslane	3.80 (5.6)	2.40 (2.6)	2.00 (0.70)	10.90 (08.6)	63.90 (054.4)	56.10 (32.2)	706.90 (2167.0)	5.10 (0.9)
Green curry	1.20 (1.3)	3.50 (0.2)	2.60 (0.60)	2.00 (02.0)	39.60 (054.4)	40.50 (47.7)	720.00 (3618.7)	1.20 (2.6)
Paneer curry	5.66 (4.8)	4.00 (6.9)	1.20 (0.75)	2.60 (02.4)	77.70 (098.0)	191.60 (185.0)	704.00 (3618.0)	1.20 (2.6)
Uttappam	5.40 (5.0)	3.10 (3.5)	3.56 (1.90)	21.69 (39.0)	104.80 (130.0)	58.05 (44.1)	694.65 (0200.0)	5.22 (2.6)
Missi roti	9.73 (6.9)	3.40 (3.8)	2.46 (1.40)	17.29 (26.3)	96.20 (072.4)	46.40 (66.6)	702.05 (2237.0)	6.07 (2.9)
Pulihora	5.30 (4.4)	2.70 (2.7)	2.10 (1.80)	39.80 (40.0)	45.50 (043.9)	35.50 (32.5)	343.80 (0192.8)	4.60 (2.0)
Pakodi	5.66 (5.9)	6.20 (6.6)	2.30 (0.60)	14.68 (26.3)	86.50 (082.4)	45.80 (39.3)	713.40 (2180.0)	4.30 (1.4)
Vada	6.93 (6.1)	6.00 (6.3)	1.72 (0.60)	17.94 (15.0)	106.70 (138.0)	28.50 (40.1)	709.20 (1675.0)	4.72 (2.3)
Green chutney	5.24 (6.0)	3.18 (4.2)	3.00 (2.20)	4.00 (03.0)	75.05 (078.0)	11.55 (09.6)	693.15 (2874.0)	1.30 (0.6)

Figures in parenthesis is the depiction of control. RGD = Red gram dal; BGD = Bengal gram dal

Table 2: Sensory scores of the recipes made with *Portulaca oleracea*

Item	Appearance	Flavor	Taste	Over acceptability
Red gram dal	4.65±0.40* (4.10±0.52)	4.67±0.40* (4.10±0.50)	4.70±0.37* (4.12±0.50)	4.70±0.377* (4.10±0.50)
Bengal gram dal	0.22±0.59ns (4.55±0.48)	4.22±0.59ns (4.50±0.48)	4.20±0.59ns (4.50±0.48)	4.22±0.59ns (4.55±0.48)
Green curry	4.15±0.46ns (4.00±0.56)	0.15±0.45ns (4.00±0.56)	4.15±0.46ns (3.97±0.59)	4.15±0.46ns (4.00±0.56)
Paneer curry	3.70±0.57* (4.45±0.42)	3.65±0.56* (4.40±0.44)	3.70±0.57* (4.45±0.42)	3.70±0.57* (4.45±0.42)
Missi Roti	4.27±0.57ns (4.35±0.51)	4.05±0.62ns (4.32±0.52)	4.10±0.52ns (4.37±0.53)	4.20±0.52ns (4.32±0.52)
Vada	4.15±0.48ns (4.25±0.47)	3.87±0.62ns (4.07±0.49)	4.10±0.50ns (4.37±0.53)	4.00±0.51ns (4.17±0.49)
Pakodi	3.87±0.50ns (4.20±0.61)	3.65±0.44* (4.05±0.64)	3.85±0.32ns (4.07±0.65)	3.72±0.37ns (4.00±0.56)
Utappam	3.85±0.56* (4.35±0.54)	3.62±0.53* (4.15±0.63)	3.65±0.49* (4.32±0.52)	3.72±0.52* (4.32±0.49)
Pulihora	3.87±0.60* (4.37±0.53)	3.65±0.53* (4.27±0.63)	3.72±0.52* (4.40±0.50)	3.72±0.49* (4.32±0.49)
Green chutney	4.20±0.67ns (4.22±0.65)	4.10±0.68ns (4.25±0.66)	0.05±0.59ns (4.12±0.52)	4.17±0.59ns (4.15±0.63)

Figures in the parenthesis { () } are control values; ns - not significant; *Significant at 0.05% level (p<0.05)

chutney and snacks (pakoda and vada) as seen in Table 2 but were significantly different than control in red gram and paneer curry, utappam and pulihora. Ward *et al.* (2009) based on selective chemical and physical properties studied patties containing 5 and 10% purslane for sensory evaluation for colour, juiciness tenderness texture and flavor and rated 5% incorporation to be significantly better than 10% incorporation. The flavour of the recipes were compared and recipes made with redgram, paneer curry, pakoda, utthappam and pulihora were significant (p>0.05) and no significant difference was observed in Bengal gram dhal, green curry, missi roti, vada and green chutney. Taste of the recipes was rated lower (p<0.05) than the control in Bengal gram dhal, green curry, missi roti, vada, pakoda and green chutney at the 5% level and rated higher than control in red gram, paneer curry, utthappam and pulihora. Overall recipes made with red gram, paneer, utthappam and pulihora were rated high by the panelists than control and the rest of the recipes were significantly lower at 5%.

Conclusion: Millions of people in developing countries depend on wild resources, including wild medicinal and edible plants, for their health care and to meet dietary needs (Balick and Cox, 1996; Balemie and Kebebew, 2006). There is a growing ignorance among young people today about the traditional uses of wild edible plants (Odhav *et al.*, 2007). The present study was carried out with the goal of quantifying some of the nutritional parameters of *Portulaca oleracea*, as well as its suitability as a recipe in the local flavor and cuisine which was seen to be very well accepted.

REFERENCES

- Anonymous, 1998a. Edible Wild: Purslane (*Portulaca oleracea*). In <http://www.Ediblewild.com/purslane.html>.
- Anonymous, 1998b. Big Blooming Purslane - Big, Beautiful and Edible - Dolly Parton's Pride. In <http://aggie-horticulture.tamu.edu/plantanswers/98/promotions/april/april.html>.
- Anonymous, 2003. Gender perspective in farm and home management and utilization of underutilized foods towards household nutrition security, PSR-62, NATP.
- Balemie, K. and F. Kebebew, 2006. Ethnobotanical study of wild edible plants in Derashe and Kucha Districts, South Ethiopia. *J. Ethnobiol. Ethnomedicine*, 2: 1-9.
- Balick, M.J. and P.A. Cox, 1996. Plants, People and culture, the Science of Ethnobotany, Scientific American Library series.
- Dawkins, N.L. and J.A. Ward, 2010. Chemical and microstructural characteristics of purslane based high protein vegetable patties. Presented at Institute of Food Technologists (IFT) 2010 meeting on Jul 19, 2010, 11:00 AM - 1:30 PM Chicago, Illinois.
- Gopalan, C., B.V.R. Sastri and S.C. Balasubramanian, 2004. Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, India, pp: 2-58.
- Hernando Bermejo, J.E. and J. Leon, 1994. Neglected Crops: 1492 from a Different Perspective. Plant Production Protection Series No. 26. FAO Rome Italy, pp: 303-332.

- Heyne, K., 1950. De nuttige planten van Indonesia (The useful plants of Indonesia). 3rd Edn., Vol 1. W. van Hoeve, 's - Gravenhage, the Netherlands and Bandung (Indonesia).
- Kochilas, D., 2001. Tomatoes, Potato and Purslane Salad. In Gourmet. <http://www.gourmed.gr>.
- Mohamed, A.I. and A.S. Hussein, 1994. Chemical composition of purslane (*Portulaca oleracea*). Plant Foods Human Nutr., 45: 1-9. In FSTA.
- Nalwade, V., M. Manu, V. Kokil and V. Zanvar, 2005. Nutritional intervention for iron and vitamin A deficient school children. The In. J. Nutr. Diet., 42: 465-474.
- Odhav, B., S. Beekrum, U.S. Akula and H. Baijnath, 2007. Preliminary assessment of nutritional value of traditional leafy vegetables in KwaZulu-Natal, South Africa. J. Food. Compos. Anal., 20: 430-435.
- Pandey, M., A.B. Abidi, S. Singh and R.P. Singh, 2006. Nutritional evaluation of leafy vegetable paratha. J. Hum. Ecol., 19: 155-156.
- Ranganna, S., 1992. Handbook of analysis and quality control for fruits and vegetable products. Tata McGraw Hill Publishing company limited, 2nd Edn., pp: 595-645.
- Solomon, C., 1998. Charmaine Solomon's The Encyclopedia of Asian Food. Periplus editions. Boston MA. ISBN 9625934170, 9789625934174.
- Susiarti, S., 1993. Portulaca L. In: Siemonsma, J.S. and Kasem Piluek (Editors). Plant Resources of South-East Asia No 8. Vegetables. Pudoc Scientific Publishers, Wageningen, Netherlands, pp: 227-229.
- Vijayalakshmi, P. and R.P. Devadas, 1994. Enhancing the nutritive value of convenience foods by incorporating green leafy vegetables. The In. J. Nutr. Diet., 31: 333-338.
- Ward, J.A., N.L. Dawkins, J. Shikany and R.D. Pace, 2009. Boost for Purslane The World of food ingredients. April-May, pp: 58-60.