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

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Abstract: Acceptable, nutridentse 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 (Susarati, 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 Greek 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 salad 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, salad 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 Srilanka, purslane is also stirred and fried with Maldivie 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 León, 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, nutridentse 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
to the recipe. The level of incorporation was determined
based on the recipe. 30 g of fresh (sauted or unsauted)
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 dal (Cajan cajan) and Bengal
gram dal (Cicer arietum), green curry, paneer with
greens, groundnut chutney with leaf powder and two
snack item (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 μg/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 anne greens and knolknol
leaves were incorporated at 20-50% in 10 traditional
routinely consumed products of Bangalore for iron
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, green curry, Missi roti, green

<table>
<thead>
<tr>
<th>Name of the recipe</th>
<th>Protein (g)</th>
<th>Fat (g)</th>
<th>Fiber (g)</th>
<th>Carbohydrate (g)</th>
<th>Energy (kcal)</th>
<th>Calcium (mg)</th>
<th>β-carotene (μg)</th>
<th>Iron (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red gram dhal</td>
<td>4.80</td>
<td>2.50</td>
<td>0.20</td>
<td>2.50</td>
<td>9.00</td>
<td>51.10</td>
<td>44.50</td>
<td>7.27</td>
</tr>
<tr>
<td>Bengal gram dhal</td>
<td>3.90</td>
<td>2.40</td>
<td>0.10</td>
<td>2.00</td>
<td>10.90</td>
<td>63.90</td>
<td>56.10</td>
<td>7.17</td>
</tr>
<tr>
<td>Green curry</td>
<td>1.20</td>
<td>0.30</td>
<td>0.15</td>
<td>2.00</td>
<td>1.00</td>
<td>2.00</td>
<td>40.50</td>
<td>7.10</td>
</tr>
<tr>
<td>Panneer curry</td>
<td>5.66</td>
<td>4.00</td>
<td>1.20</td>
<td>2.00</td>
<td>2.00</td>
<td>77.70</td>
<td>101.60</td>
<td>4.20</td>
</tr>
<tr>
<td>Uttappam</td>
<td>5.40</td>
<td>3.10</td>
<td>3.56</td>
<td>21.60</td>
<td>21.60</td>
<td>104.80</td>
<td>56.05</td>
<td>2.20</td>
</tr>
<tr>
<td>Missi roti</td>
<td>9.70</td>
<td>3.40</td>
<td>3.40</td>
<td>2.46</td>
<td>17.29</td>
<td>96.20</td>
<td>46.40</td>
<td>6.07</td>
</tr>
<tr>
<td>Pulihora</td>
<td>5.30</td>
<td>2.70</td>
<td>2.10</td>
<td>39.80</td>
<td>101.60</td>
<td>45.50</td>
<td>35.30</td>
<td>4.20</td>
</tr>
<tr>
<td>Pakodi</td>
<td>5.86</td>
<td>6.20</td>
<td>6.20</td>
<td>14.98</td>
<td>186.70</td>
<td>40.50</td>
<td>35.30</td>
<td>4.20</td>
</tr>
<tr>
<td>Vada</td>
<td>6.50</td>
<td>6.00</td>
<td>6.10</td>
<td>17.94</td>
<td>106.70</td>
<td>28.50</td>
<td>11.55</td>
<td>4.20</td>
</tr>
<tr>
<td>Green chutney</td>
<td>5.24</td>
<td>3.16</td>
<td>4.20</td>
<td>3.00</td>
<td>4.00</td>
<td>75.05</td>
<td>9.00</td>
<td>4.72</td>
</tr>
</tbody>
</table>

Figures in parenthesis is the depiction of control. RDG = Red gram dhal; BDG = Bengal gram dhal

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Appearance (x±s)</th>
<th>Flavor (x±s)</th>
<th>Taste (x±s)</th>
<th>Over acceptability (x±s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red gram dal</td>
<td>4.65±0.40*</td>
<td>4.67±0.40*</td>
<td>4.70±0.37*</td>
<td>4.70±0.377*</td>
</tr>
<tr>
<td></td>
<td>(4.10±0.52)</td>
<td>(4.10±0.50)</td>
<td>(4.12±0.50)</td>
<td>(4.10±0.50)</td>
</tr>
<tr>
<td>Bengal gram dal</td>
<td>0.22±0.59ns</td>
<td>4.22±0.59ns</td>
<td>4.20±0.59ns</td>
<td>4.22±0.59ns</td>
</tr>
<tr>
<td></td>
<td>(4.55±0.58)</td>
<td>(4.55±0.58)</td>
<td>(4.55±0.58)</td>
<td>(4.55±0.58)</td>
</tr>
<tr>
<td>Green curry</td>
<td>4.15±0.46ns</td>
<td>0.15±0.46ns</td>
<td>4.16±0.46ns</td>
<td>4.16±0.46ns</td>
</tr>
<tr>
<td></td>
<td>(4.00±0.56)</td>
<td>(4.00±0.56)</td>
<td>(4.00±0.56)</td>
<td>(4.00±0.56)</td>
</tr>
<tr>
<td>Paneer curry</td>
<td>3.70±0.57*</td>
<td>3.65±0.59*</td>
<td>3.70±0.57*</td>
<td>3.70±0.57*</td>
</tr>
<tr>
<td></td>
<td>(4.45±0.42)</td>
<td>(4.45±0.42)</td>
<td>(4.45±0.42)</td>
<td>(4.45±0.42)</td>
</tr>
<tr>
<td>Missi Roti</td>
<td>4.27±0.57ns</td>
<td>4.05±0.62ns</td>
<td>4.10±0.52ns</td>
<td>4.20±0.52ns</td>
</tr>
<tr>
<td></td>
<td>(4.35±0.51)</td>
<td>(4.35±0.51)</td>
<td>(4.35±0.51)</td>
<td>(4.35±0.51)</td>
</tr>
<tr>
<td>Vada</td>
<td>4.15±0.48ns</td>
<td>3.67±0.62ns</td>
<td>4.10±0.50ns</td>
<td>4.00±0.51ns</td>
</tr>
<tr>
<td></td>
<td>(4.25±0.47)</td>
<td>(4.07±0.49)</td>
<td>(4.37±0.53)</td>
<td>(4.17±0.49)</td>
</tr>
<tr>
<td>Pakodi</td>
<td>3.87±0.50ns</td>
<td>3.65±0.44*</td>
<td>3.86±0.32ns</td>
<td>3.72±0.37ns</td>
</tr>
<tr>
<td></td>
<td>(4.20±0.61)</td>
<td>(4.05±0.64)</td>
<td>(4.07±0.65)</td>
<td>(4.00±0.56)</td>
</tr>
<tr>
<td>Utappam</td>
<td>3.85±0.56*</td>
<td>3.62±0.53*</td>
<td>3.65±0.49*</td>
<td>3.72±0.52*</td>
</tr>
<tr>
<td></td>
<td>(4.35±0.54)</td>
<td>(4.15±0.63)</td>
<td>(4.32±0.52)</td>
<td>(4.32±0.52)</td>
</tr>
<tr>
<td>Pullhora</td>
<td>3.87±0.60*</td>
<td>3.65±0.53*</td>
<td>3.72±0.52*</td>
<td>3.72±0.54*</td>
</tr>
<tr>
<td></td>
<td>(4.37±0.53)</td>
<td>(4.27±0.53)</td>
<td>(4.32±0.50)</td>
<td>(4.32±0.50)</td>
</tr>
<tr>
<td>Green chutney</td>
<td>4.20±0.67ns</td>
<td>4.10±0.88ns</td>
<td>0.05±0.59ns</td>
<td>4.17±0.59ns</td>
</tr>
<tr>
<td></td>
<td>(4.22±0.96)</td>
<td>(4.25±0.98)</td>
<td>(4.12±0.52)</td>
<td>(4.15±0.63)</td>
</tr>
</tbody>
</table>

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

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, 2003. Gender perspective in farm and home management and utilization of underutilized foods towards household nutrition security, PSR-62, NATP.


