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RESEARCH ARTICLE

DEVELOPMENT OF A SOUP THICKENER POWDER FROM PUMPKIN SEEDS AND COWPEAS

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ABSTRACT

Many rural communities face seasonal food shortages during the dry season and just before harvest. Food supplies are scarce resulting in diets which often lack variety of nutrients. The nutrient content of the meals can be improved by the use of nutritious soup thickeners. The objective of this study is to develop a pumpkin seeds and cowpeas (PSC) soup thickener and to analyse its proximate composition as well as sensory attributes. The PSC soup thickener was subjected to sensory analysis for taste, flavour, colour and acceptability by randomly selected taste panels. The soup thickener was analysed for its moisture, energy, protein, fat, carbohydrates and fibre content. Nutritional analysis of the soup thickener demonstrated that there was a significant difference in protein content in comparison with the conventional soup thickeners. The sensory analysis revealed that the flavour, taste and overall acceptability were good. The research revealed that the pumpkin seeds and the cowpeas can be used to make cheap soup thickeners that will help provide the vital nutrients to the body.

INTRODUCTION

Several indigenous foods are found in Zimbabwe and are known to possess high nutritional and economic value. Some of the products that have been made using indigenous based ingredients like wild fruits, sweet potatoes and nuts are wine, jam, chips and ketch up. Many of these indigenous crops are grown for subsistence and among them are locally available, underexploited and often neglected plant crops. These include cowpeas and pumpkins seeds. Shava (2000), propounded that the potential utilisation of these crops may help improve the food security within household and nutritional status of the household members. In this same manner, effective utilisation of cowpea and pumpkin seeds can be a strategy in improving household food availability and broadening of the food base thereby promoting a diversified diet. This will in turn reduce malnutrition among the vulnerable people since food insecurity is the underlying cause of all forms of malnutrition including micronutrient deficiencies. The Zimbabwe Vulnerability Assessment Committee (ZIMVAC), 2011 results indicated that a greater proportion (80%) of households experienced dietary diversity. Households still face seasonal food shortages due to unreliable rains and climate changes resulting in consumption of meals lacking all the nutrients like groundnuts, mealie meal and vegetables. Also other households afford poor diets which are low in protein, limited in variety and deficient in essential vitamins and minerals. On the other hand household dietary diversity or a varied diet is likely to provide all of the nutrients for both adults and children. Therefore the addition of soup thickener powders to basic meals may help to improve the nutritional content by providing a variety of nutrients depending on the ingredients (pumpkin seeds and cowpeas) used. Cowpea and pumpkin seeds are high energy foods that contain many kilocalories and they are readily available as a kilogram of dried cowpeas contains 3400 kilocalories while a kilogram of uncoated pumpkin seed contains 6100 kilocalories, (Rivas-Vega, 2006).

Cowpea is a traditional legume that provide affordable and significant source of proteins and contributes to a healthy diet. Cowpeas help manage metabolic diseases such as diabetes mellitus (Rangel *et al.*, 2003). Pumpkin seeds are not commonly allergenic food and are good sources of minerals such as phosphorus, magnesium, manganese, zinc, iron, copper, protein and vitamin K, (El- Adawy and Taha 2001). Pumpkin seed has considerable nutritional value for human consumption due to its high oil (37.8-45.45%) oil and protein (25.2-37.0%) content. It has a valuable dietetic and medicinal advantages besides being a source of edible oils, proteins and minerals of good quality (Yoshida *et al.,* 2004**).** Besides being a nutritionally rich product, the soup thickener powder can also be advantageous to individuals who are vegetarians or gluten intolerant. Some of the artificial ingredients which are added to the thickeners may pose a risk to individuals who may be allergic to those ingredients. According to Vesanto (2010), flavour enhancer, monosodium glutamate (E621) causes Chinese Restaurant Syndrome (CRS). There is great need to increase the availability of a variety of thickeners which are organic in nature. This study focuses on the preparation of soup thickener from cowpeas and pumpkin seeds. The soup thickener was developed as a way of improving the nutrient content of meals which in most rural households lack variety resulting in nutrient deficiencies. Pumpkin seed is rich in proteins, healthy fats such as omega 3 and omega 6 fatty acids and is a storehouse of many of the vital mineral elements required by the body for its proper function (Giami, 1992). Cowpea flour contains high protein, high carbohydrate content and minerals such as potassium. Other incorporated ingredients are the pumpkin flour which is rich in vitamin A which

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prevents night blindness in children (Rivas-Vega, 2006). To the best of our knowledge no such soup thickeners prepared from these ingredients have been reported in literature.

METHODOLOGY

Preparation of cowpea and pumpkin seed flours

Cowpeas and pumpkin seeds were collected from a local farm. The cowpeas (500 g) were soaked for 12 h, boiled to soften them, oven dried at 75^{o}C for 6 h and finally ground to a powder. The pumpkin seeds were sun dried. This was followed by roasting at 60^{o}C (to denature proteins), grinding to a powder and finally sieving.

Nutritional composition of ingredients

The protein, fat, fibre and moisture content were determined by the near infrared analyzer (spectrasta 2400). The energy content of the pumpkin seed cowpea soup thickener powder and the control was determined using a bomb calorimeter. Dry ashing was carried out for the proximate composition of ash content. All the experiments were done in triplicates. Carbohydrate content was found by subtracting the measured protein, fat, ash, fibre and water from the total weight (Bender, 2006).

Preparation of seed cowpea (PSC) soup thickener

Pumpkin flour (45 wt%), cowpea (40 wt%), pumpkin flour (7 wt%), rice flour (5 wt%) and salt (2 wt%) were mixed and blended together. Citric acid (1 wt%) was added to the mixture as an antioxidant.

RESULTS AND DISCUSSION

Nutritional composition

Table 1 gives a summary of the nutritional compositions of the commercial soup and PSC. The protein content of the commercial soup (control) is lower in protein content (11.7%) compared to PSC (12.5%). Although the control has a reasonable high protein content, the proteins are not readily available and hence are of low biological value for use by the body's metabolic processes. Cowpeas and pumpkin seeds contain readily available proteins in form of essential amino acids required by the body (Rangel *et al*., 2003; Fokou *et al*., 2004).

The high ash content in PSC soup thickener (5.3 g) in comparison to the commercial soup indicates a large concentration of mineral salts because the pumpkin seed kernels were also ground to a powder which was the main ingredient.

Table 1. Nutritional composition of soups

Parameter	Commercial soup	PSC
Protein content (%)	11.7	12.5
Fat content (%)	3.3	4.6
Energy content (kJ)	1215	1280
Moisture content (%)	11.3	11.5
Ash content (g/100g)	3.4	5.3

Sensory evaluation tests

Table 2 gives a summary of responses for sensory evaluation tests. According to Hounhouigan *et al* (1993), the so called physical attributes of products are key measures of quality including the sensory and organoleptic parameters such as colour, aroma, consistency, texture, taste and overall acceptability. PSC soup gave responses mostly from good to excellent. PSC compares favourably with the commercial soup. The taste of the PSC soup was very good due to the nutty flavour of the pumpkin seeds kernels. There is no need of adding flavour enhancers which have little or no flavor on their own but accentuate the natural flavour of foods, (Bender, 2006).The colour of the commercial soup was superior to that of PSC most probably due to the presence of husks from pumpkin seeds. Removal of husks greatly improves colour. Addition of colouring agents such as caramel will make PSC more appealing. Colour plays a role in food choice by influencing the taste thresholds, sweetness perceptions, food preference, pleasantness and acceptability (Brender, 2006).

Overall acceptability of the PSC

Overall acceptability is represented on a pie chart in Fig. 1. Most (90%) respondents accept the PSC soup. The overall acceptability of the PSC gravy was good (90%) considering the fact that it is a new product using these blended indigenous ingredients. However a small proportion did not accept the product. This might be due to individuals getting used to these modern additives which are used in soup thickener powders and disliking the nutty flavour which is associated with the cowpea flour as described by (Prinyawiwatkul *et al.,* (1996). Most individuals are more concerned with the flavour as well as the taste of the soup thickener overlooking the nutritional content.

Table 2. Sensory evaluation tests

Grade	Taste		Flavour		Colour	
	Commercial soup	PSC	Commercial soup	PSC	Commercial soup	PSC
Poor	1	0	0	1	0	3
Average	6	1	0	4	0	6
Good	8	6	6	10	8	9
Very Good	5	7	8	4	8	1
Excellent	0	6	6	1	6	1

digestibility of proteins. PSC has a higher fat content than the commercial soup. Lazos (1986) and El-Adawy and Taha (2001) observed linoleic acid as the principal fatty acid in pumpkin seed oil, followed by oleic, palmitic, and stearic acids. PSC soup thickener powder has higher energy content because of the higher fat content in the pumpkin seeds. Carbohydrates were the major constituents in cowpeas, rice flour and pumpkin seed flour also contributes to a higher energy of PSC. The moisture content of the PSC soup thickeners were comparatively in the range of the commercial soup powder. High moisture content may affect the storage quality of the soup thickener because high moisture in foods have been shown to encourage microbial growth (Temple *et al*., 1996). The soup thickeners can be stored for long periods due to low moisture content.

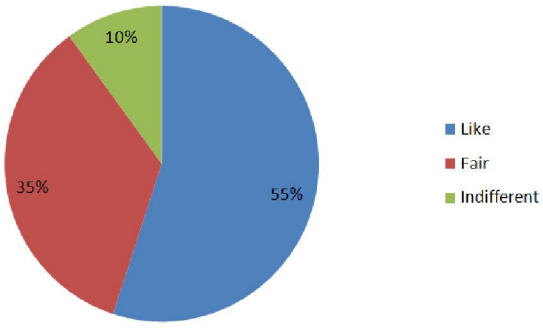

Fig. 1. Overall acceptability of PSC soup thickener

Conclusion

The product was successfully produced and had good reconstitution properties. The PSC soup thickener was nutritionally rich with a higher ash content indicating the presence of many vital mineral elements. PSC soup thickener is a better source of protein hence contributes substantially to the dietary human nutrition. The flavor and taste of the PSC were rated as good. There is no need of addition of artificial enhancers to PSC that are potentially a health hazard.

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