RESEARCH PAPER — FOOD SCIENCE RESEARCH JOURNAL

e ISSN-2230-9403 ■ Visit us : *www.researchjournal.co.in*
Volume 7 | Issue 2 | October, 2016 | 202-206
DOI : 10.15740/HAS/FSRJ/7.2/202-206

Nutrient potential of watermelon (*Citrullus lanatus*) seeds and its incorporation in product preparation

JYOTI TAK AND SHASHI JAIN

The water melon seeds were analyzed for its different properties such as the physico-chemical and functional properties and nutritional properties. The seeds were also incorporated in products to assess the acceptability. Watermelon seeds have been protected with hard cover which is to be removed for the use of seeds in products. The water melon seed revealed as light cream in colour and oval in shape. The average seed length was 8.01±1.02 (mm) and weight was 0.82±0.1(g) and volume 3.42 (ml), respectively. Water absorption capacity (%) found 116.3±0.1 and the least gelatinization capacity was 29.7±0.2. The result of proximate composition of watermelon seeds reveals that moisture content of seed was low 4.9 g, ash content of the seeds was 2.9 g, fat content was good which was 48.9 g, protein content was 32.6 g and energy value was high 619 kcal per 100 g. The powder was incorporated in recipes at 5 per cent, 8 per cent and 10 per cent. The overall acceptability scores of developed product ranged from 6.7 to 7.4 on 9 point hedonic scale. The results of proximate analysis indicated that watermelon seeds had the higher value of protein, fat, ash, oil and fibre contents. It is concluded that water melon seeds flour can be successfully incorporated in vegetable gravy.

Key Words : Water melon seeds, Analysis, Nutritional properties, Product preparation

How to cite this article : Tak, Jyoti and Jain, Shashi (2016). Nutrient potential of watermelon (*Citrullus lanatus)* seeds and its incorporation in product preparation. *Food Sci. Res. J.,* **7**(2): 202-206, **DOI : 10.15740/HAS/FSRJ/7.2/202-206**.

INTRODUCTION

One distinct way of achieving nutrition security in developing countries is through exploitation and utilization of available foods sources and resources. In recent times, the increasing prices of food items have lead to intensified search for alternative sources of nutrients and minerals. Thus, attention is now being focused on sources like under-utilized local seeds from plants with the aim of complementing traditional nutrient sources. India is the second largest producer of watermelon fruit among the Asian countries producing 255,000 MT per year, generating 2550 MT of seeds per year (FAOSTAT, 2009).

Watermelon (*Citrullus lantus*) seeds are one among the underutilized fruit by products. Watermelon (*Citrullus lanatus*) belongs to cucurbitaceae family. Existing evidences suggest that the watermelon seed proteins exhibit good invitro digestibility with less of antinutritional factors, the seeds contain moderate quantity of minerals and possess good functionality. Their amino acid composition (high arginine content) is indicative of the possession of the medicinal benefits (El-Adaway and Taha, 2001). They also contain high lipid level in five cucurbitaceae oil- seeds from different regions in Cameroon. Oil provides concentrated energy in diet and enhanced palatability. There are also prospects

MEMBERS OF RESEARCH FORUM

Author for correspondence :
JYOTI TAK, Department of Foods and Nutrition, College of Home Science, Maharana Pratap University of Agriculture and Technology, UDAIPUR (RAJASTHAN) INDIA
Email : jyotistak@gmail.com

Associate Authors' :
SHASHI JAIN, Department of Foods and Nutrition, College of Home Science, Maharana Pratap University of Agriculture and Technology, UDAIPUR (RAJASTHAN) INDIA

for use of the seeds in the improvement of infant nutrition in view of their high protein and fat content (Maynard, 2001).

Citrullus lanatus is an antioxidant and has been shown to reduce oxidative stress (Khaki *et al*., 2013). Effects of phytochemicals (flavonoids) on pancreatic β-cells leading to their proliferation and secretion of more insulin (Mahesh and Menon, 2004). Unfortunately the seeds are not in generally given importance and hence the present investigation was conducted to assess the functional and nutritional value of the seeds and to develop a product from watermelon seeds. They have nutritive and calorific values which make them necessary in our diets. The protein product of seed can be used as additives to food, in the same way, as soy protein and for soup, in breakfast cereals and as snacks.

In the present investigation Physico-chemical properties, functional properties and nutritional value of watermelon seeds were assessed and it is incorporated in few products to find out its acceptability.

METHODOLOGY

Sample preparation :

Seeds were procured from market and were sorted to remove bad ones, 150 g of seeds were roasted at the temperature of 80^0 C, grinded with a laboratory blender, packed in an air tight container and stored ready for further analysis.

Physical properties :

Whole watermelon seeds were selected for analysis of physical properties. It was carried out using standard techniques as seed size, number of seed in 20 g, weight of 20 seeds, seed volume and bulk density. The colour and appearance was visually examined.

Functional properties :

The water and oil absorption capacity was carried out according to the method through using centrifuge. The least gelatinization concentration was determined using method of Coffman and Garica (1977).

Chemical analysis :

It is the determination of a group of closely related compounds together. It includes determination of amount of moisture, protein, fat (ether extract), ash and fibre with nitrogen free extract and carbohydrates being estimated by subtracting the sum of these five percentages from 100.

Determination of proximate composition:

The moisture, ash, crude fibre and fat contents were determined using a standard method. The moisture content of the sample was analyzed by the moisture analyzer, ash content by ignition at 600^0 C in a Muffle furnace for six five hours, oil content extraction was done by Soxhlet extraction techniques with methyl – ether. Nitrogen content was determined using micro- kjeldahl and converted to crude protein (N x 6.25). Meanwhile the carbohydrate content was calculated by difference. A gravimetric method was used for estimation of the dietary fibre content after the enzymatic digestion of starch and protein in fat and moisture free sample.

Product development :

Keeping in view the properties of water melon seeds a ready to mix gravy powder was developed to incorporate in vegetable preparation. Water melon seeds were roosted till very light browning and after that seeds were ground to fine powder. Three recipes were selected *i.e.* loki kofta, dum aloo and shahi paneer the recipes were standardized. Powder of water melon seeds was mixed at 5, 8 and 10 per cent in each of the recipe.

Sensory evaluation of developed products:

The acceptability of powder in vegetable gravy was evaluated by a panel of 12 judges using 9-point Hedonic Scale (Ranganna, 1986) to test the liking or disliking of products. The panelist asked to record the level of liking or disliking by giving marks for various characteristics of the products. The quality attributes included were colour, taste, texture, appearance and over all acceptability.

OBSERVATIONS AND ASSESSMENT

The results obtained from the analysis are presented and discussed under the following sub headings.

Physico-chemical properties :

Physical examination of water melon seed revealed that it is light cream colour and oval in shape.

Other physical characteristics of water melon seed assessed by the parameters like seed length, seed width, number of seeds in 20g, weight of 20 seeds, seed volume,

seed density and bulk density are presented in Table 1.

Functional properties:

Result of functional properties analyzed in watermelon seed flour was water absorption, oil absorption capacity and least gelatinization concentration are presented in Table 2.

Water absorption capacity:

Water holding capacity is the ability to retain water against gravity and includes bound water, hydrodynamic water, capillary water and physically entrapped water. Table 2 reveals the water absorption capacity of watermelon seed flour was found 116.3 per cent.

Oil absorption capacity:

The higher oil absorption capacity of watermelon seed flour is equally important as it improves the mouth feel and retains the flavour. The higher oil absorption capacity suggested the presence of apolar amino acids in flour (Taira, 1974).

Nutrient composition:

The result of proximate composition of watermelon seeds reveals that moisture content of seed was low 4.9 g in 100 g of seeds. Low moisture content indicates that the seeds may not be easily attached by micro-organism during storage. The ash content of the seeds was 2.9. The Fat content was good which was 48.9 g. Fat is important in diets because it promotes fat soluble vitamin absorption and contributes to the energy content of diet. Thus, the energy value was high 619 kcal per 100 g. The crude protein value was highly comparable to protein rich foods such as soybeans, cowpeas, pigeon peas, pumpkin

Table 1: Physico-chemical properties of watermelon seed

Sr. No.	Physical properties	Mean ± SD
1.	Seed length (mm)	8.01±1.02
2.	Seed width (mm)	0.32±0.1
3.	No. of seed in 20g	45.3±4.21
4.	Weight of 20 seeds (g)	0.82±0.1
5.	Seed volume (ml)	3.42
6.	Seed density (g/ml)	0.64±0.3
7.	Bulk density (g/ml)	0.47±0.0

Table 2 : Functional properties of watermelon seeds

Sr. No.	Functional properties	Mean ± SD
1.	Water absorption capacity (%)	116.3±0.1
2.	Oil absorption capacity (%)	123.5±0
3.	Least gelatinization concentration (%)	29.7±0.2

Table 3 : Proximate composition (100 g)

Nutrients	Mean
Moister (g)	4.9
Protein (g)	32.6
Fat (g)	48.9
Fibre(g)	1.8
Ash (g)	2.9
Carbohydrates (g)	8.9
Energy (kcal)	619

Table 4 : Acceptability of developed vegetable gravy at 8 per cent

Treatments	Colour	Texture	Flavour	Appearance	Taste	Overall acceptability
T_0 (control)	8.6±0.51	8.7±0.48	8.4±0.69	8.6±0.51	8.6±0.51	8.5±0.33
T_1 (8% in paneer veg.)	8.1±0.56	7.9±0.31	7.5±0.70	7.6±0.51	8.2±0.63	7.8±0.40
T_2 (8% in dum aloo veg.)	7.6±0.84	8.1±0.56	7.8±0.63	7.9±0.56	7.9±0.56	7.8±0.51
T_3 (8% in loki kofta veg.)	6.7±0.48	7.3±0.48	7.1±0.56	7.0±0.81	7.0±0.66	7.0±0.35

and gourd seeds, which was 32.6 g. The carbohydrate content of seeds was 8.9 g. The crude fibre of seeds was 1.8 g (Table 3).

Development of product :

The sensory evaluation of the developed recipes was carried out in order to assess the acceptability. The overall acceptability scores of developed product ranged from 6.7 to 7.4 on 9 point hedonic scale. The powder was incorporated in recipes at 5 per cent, 8 per cent and 10 per cent. The overall acceptability was found highest at 8 per cent incorporation of the powder in all three recipes. Sensory scores prepared with the incorporation of 8 per cent water melon seeds powder. Further, it can be reveled that upto 10 per cent incorporation of watermelon seeds powder was less comparable with control as general decrease in all sensory attributes was observed with the increase in the incorporation of watermelon seeds powder upto 8 per cent (Table 4).

Conclusion:

The results of proximate analysis indicated that watermelon seeds had the higher value of protein, Fat, ash, oil and fibre contents. The fat/lipid content makes it a good source of oil, and an energy source in the body. Fat and protein together account for 3/4th the weight of watermelon seeds, this shows that it has good potential as a protein source. With findings, the watermelon seeds are very good and contained a very high concentration of nutrients for both human and livestock consumption. It is concluded that water melon seeds flour can be successfully incorporated in vegetable gravy as it increases the thickness, nutrition and taste. On the basis of sensory evaluation watermelon seed flour incorporation in vegetable gravy was found best at 8 per cent (8 g) with regards to its overall acceptability.

LITERATURE CITED

Asils, S., Kamel, H. and Kakuda, Y. (2003). Characteristics and composition of melon and grape seed oils and cakes. *J. Am. Oil Chem. Soc.,* **62**(5) : 881-884.

Coffman, C.W. and Garcia, V.V. (1977). Functional properties and amino acid content of a protein isolate from mung bean flour. *J. Food Techol.,* **12** : 473.

Das, M., Das, S.K. and Suthar, S.H. (2002). Composition of seed and characteristics of oil from karingda (*Citrullus lanatus*, Thumb,Mansf). *Internat. J. Food Sci. Technol.,* **37** : 893-896.

El-Adaway, T.A. and Taha, K.M. (2001). Characteristics and composition of different seed oils and flours. *Food Chem.*, **3** : 54-74.

FAO (Food and Agriculture Organization of The United Nations). 2009. In C. Dignan, B. Burlingame, S. Kumar, and W. Aalbersberg (Eds.), The Pacific islands food composition tables (2nd Ed.). ROME, ITALY.

Giami, S.Y., Achinewhu, S.C. and Ibaakee, C. (2005). The quality and sensory attributes of cookies supplemented with fluted watermelon seed flour. *Internat. J. Food Sci. & Technol.,* **40** : 613-620.

Hassan, H.A. (2006). Biochemical and technological studies on watermelon seed oil. M.Sc. Thesis, University of Khartoum, Sudan.

Heim, K., Tagliaferro, A. and Bobliya, D. (2002). Flavonoid antioxidants: chemistry, metabolism and structure-activity relationships. *J. Nutr. Biochem*., **13**(10): 572–584.

Iakshmi, A.J. and Kaul, P. (2011). Nutritional potential, bioaccessibility of minerals and functionality of watermelon (*Citrullus vulgaris*) seeds. *Food Sci. & Technol*., (44) 1821-1826.

Ibeanu, VN., Onyechi, U. and Ugwuanyi, G. (2010). Nutrient and dietary fibre profile of dehulled and undehulled seeds of watermelon (*Citrullus lanatus*) consumed in Nigeria. *Internat. J. Basic & Appl. Sci.,* **12**(6): 249- 257.

Johnson, J.T., Iwang, E.U., Hemen, J.Z., Odey, M.O., Efiong, E.E. and Eteng, O.E. (2012). Evaluation of anti-nutrient contents of watermelon *Citrullus lanatus*. *Ann. Biol. Res.,* **3**(11) : 5145-5150.

Khaki, A., Fatemeh, F. and Ohammed, N. (2013). Effects of water melon seed extract (*Citrullus vulgaris*) on spermatogenesis in rat. *Internat. J. Women's Health Reproduction Sci*., **1** : 3.

Mahesh, T. and Menon, V.P. (2004). Quercetin lleviates oxidative stress in streptozotocin- induced diabetic rats. *Phytother Res.,* **18**: 123-127.

Maynard, D.N. (2001). An introduction to the watermelon. In: D.N. Maynard (ed.) Watermelons. Characteristics, production and marketing. ASHS Press, Alexandria, Va. 9-20.

Mehra, M., Pasricha,V. and Gupta, R. (2015). Estimation of nutritional, phytochemical and antioxidant activity of seeds of musk melon (*Cucumis melo*) and water melon (*Citrullus lanatus*) and nutritional analysis of their respective oils. *J. Pharmacognosy & Phytochem*., **3**(6): 98-102.

Ojieh, G.C., Oluba, O.M., Ogunlowo, Y.R., Adebisi, K.E. and Orole, R.T. (2007). Compositional studies of *Citrullus lanatus* (Egusi melon) seed. *Internat. J. Nutr. & Wellness*, **6** (1): 1-5.

Ranganna, S. (1986). *Handbook of analysis and quality control for fruit and vegetable products*, II[nd] Ed. Tata McGraw Hill Publ. Co., NEW DELHI, INDIA.

Sodeke, V.A. (2005). Extraction of oil from watermelon seed and analysis, quarterly research service. *J. Food Sci*., **2** : 5-30.

Srilakshmi, B. (2007). Evaluation of food quality, sensory evaluation. New Age International Publishers, *Food Sciences*. **4**: 56.

Taira, H. (1974). Buckwheat introduction, Encyclopedia of Food Technology, p.139. Westport: AVI.

Tlili, I., Hdider, C., Lenucci, M.S., Ilahy, R., Jebari, H. and Dalessandro, G. (2011). Bioactive compounds and antioxidant activities of different watermelon (*Citrullus lanatus* (Thunb.) Mansfeld) cultivars as affected by fruit sampling area. *J. Food Composit. & Anal.*, **24**: 307-314.

Umar, A., Shuaibu, M. and Bello, A. (2013). Nutritional and mineral analyses of water melon seeds (*Citrullus lanatus*). *J. Medical & Biol. Sci.*, **3**(1): 89-97.

Received : *17.06.2016;* **Revised:** *03.08.2016;* **Accepted :** *19.08.2016*