WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 11, Issue 17, 6-13. Research Article ISSN 2277– 7105

PROXIMATE ANALYSIS OF TWO VARIETIES OF CAPSICUM SPECIES

Zafar Iqbal[1]*, Nasrullah[2] and Abeera Zafar[3]

[1]Applied Chemistry Research Centre, PCSIR Laboratories Complex, Lahore-54000-Pakistan.

[2]Department of Chemistry, Govt. College University Faisalabad.

[3]Department of Pharmacy, University of Hajvery, Lahore.

Article Received on
28 October 2022,

Revised on 18 Nov. 2022,
Accepted on 08 Dec. 2022

DOI: 10.20959/wjpr202217-26417

***Corresponding Author**
Dr. Zafar Iqbal
Applied Chemistry Research Centre, PCSIR Laboratories Complex, Lahore-54000-Pakistan.

ABSTRACT

Oleoresin from two varieties (Round and long) of *Capsicum annum* have been extracted by using *n*-hexane and ethyl acetate through Soxhlet apparatus. Proximate analysis i.e. protein content, fiber content, moisture content and fat content has been determined. Moisture contents, Dry mass, protein, ash contents, fat and fiber in capsicum annum (round variety) were 4.66%, 95.33%, 2.94%, 5.17 %, 2.99 %, 10.55% while in capsicum annum (long variety) were 6.37%, 93.62%, 2.51%, 4,13 %, 2.7%, and 11.03% respectively. The results revealed that these verities are rich in nutritional contents and are valuable for human consumption.

INTRODUCTION

Capsicum is also known as chilli, widely cultivated almost in all around the world, used both as spice and as medicinal plant. Chilli also called red pepper belongs to the genus capsicum, under the *Solanaceae* family, genus capsicum having 26 species. Chillies were introduced to sub-continent (Indo-Pak) by Portuguese traders from Brazil. Chillies are referred to as chillies, bell peppers, Chile, paprika, hot peppers, red peppers, pod peppers, pimento, cayenne peppers, and capsicum in various regions of the world. Chillies have been used widely for its unique pungent taste and dazzling colours.[1-5]

Pakistan is going through difficult period to compete global market for chilli export. Pakistan is among the major chilli producers and exporters viz. China, Morocco, Mexico and Turkey, but in the global scenario 25% (11lac tons) of the total chilli produce is contributed by India. The global chilli production is about 7 million tons from an area of 1.5 million hectares.

Pakistan accounts for 2 lac tons, less than China (4lac) and Mexico (3tons). Among the top chilli producers and exporters India supplies 25%, China 24%, Spain 17%, Mexico 8%, Pakistan 7.2%, Morocco 7% and Turkey 4.5%. India not only leading in production but also in export, supplying one fourth of total chillies exported globally. In Pakistan chilli is economically important and valuable cash crop, grown in all four provinces and widely used in Pakistani cuisine like other South Asian countries. Chillies are used in a variety of ways in making the ordinary dishes spicy, delicious and more captivating in traditional cuisine of Pakistan, also used as vegetable in pickles, salads, and in appetizers. Pungency in chillies makes them useful in medicine preparation.[6] Chillies are used in all arthritis treatments, also in neuropathic pain and dermatologic conditions. Pakistan is the fourth largest producer of red chillies after India, China and Mexico. The total production of red chilli in Pakistan was recorded 143.1 thousand tonnes, from an area of 64.2 thousand ha.[7] In Sindh, Chillies are cultivated on an area of 38.4 thousand hectares with production of 53.7 thousand tonnes. The average yield of 1.7 tons per hectare contributes 1.5 percent of the country's GDP. In Pakistan, Kunri a small town of Umer Kot district, formerly known as chilli capitol of Asia. It contributes about 85% of Pakistan's Red Chilli production and is known as one of the largest production centres.

Phytochemicals are very important for our health and naturally occurring substance play key role. These phytochemicals from spices are not only used in food but also used in food packaging. Lipid oxidation can occur in fat based food packaging and this packaging is important because this lipid oxidation spoil the food (8-9). In this study two variety of capsicum annum (Long and Round) were evaluated for their proximate analysis.

Raw materials

The dried two verities of *capsicum annum* were purchased from local market of Pattoki. Seeds of both verities were separated. All chemicals were purchased from the local chemical market in Lahore.

Extraction of oleoresin

200 g of powdered of *capsicum annum* (Round and Long) were placed inside the thimble and extraction was carried out by using *n*-hexane ad ethyl acetate (50:50) thourgh sohxlet apparatus. Process of extraction was continued for 5 hours under reflux. After the extraction product was collected and purified by removing the solvent through distillation. The resulted sample was taken in the petri dishes and left under the air for one hour to remove all the

solvent. The oleoresin was obtained as a dark red liquid and had strong aroma. Meal was collected and its proximate analysis was performed through standard procedures.

Proximate analysis of meal of *capsicum annum*

The proximate analysis such as moisture content, protein analysis, fat content, ash content, fiber content and free nitrogen value of *Capsicum annum* meal were done.

Estimation of moisture from the extract

Moisture in the oleoresin extract of *capsicum annum* was determined by the following procedure. For this analysis two aluminum dishes were washed and labeled and placed in an oven (for 30 minutes) to remove moisture. The aluminum dishes were placed in vacuum desiccator for cooling. After drying Aluminum dishes were weighed by using weight balance before the sample was placed in them. 4.50 g of round *capsicum annum* and 4.86 g of long *Capsicum annum* grounded sample was taken in two separate aluminum dishes and spread the sample across the bottom of dishes with the help of tong. Then weigh the samples along with aluminum dishes. The sample was dried at 105ºC for 5 hours in an oven.

After the drying time was over, sample was removed from the oven and placed in the desiccators. Then it was cooled at room temperature and was weighed accurately. The loss of weight is reported as percent moisture.

$$\% \text{ Moisture} = \frac{\text{loss in weight}}{\text{weight of sample}} \times 100$$

Estimation of protein from the sample

Protein from the samples was determined by the Kjeldahl Method. For this analysis 0.21231g of sample round *capsicum annum* and 0.2286g of long was placed in two digestion flask and added digestion mixture and 20 mL H_2SO_4 and preceded for digestion. Placed the two digestion flask on the heat source for boiling and continued boiling till clear liquid. It was cooled and transferred the digested samples to the volumetric flask and make up the volume with distilled water up to 100 mL. 2% boric acid solution was taken in 4 separate 100 mL of conical flasks and connected it with tip of condenser of distillation unit. 5mL sample was placed in distillation flask with pipette. Added 15 mL of 40 percent sodium hydroxide and started distillation. Continued distillation until shade of boric acid solution was changed. Titrated the collected distillate with standard HCl solution four brief readings were taken to determine the volume.

$$\text{Nitrogen \%} = \frac{\text{Titer used} \times 0.4}{\text{weight of sample}}$$

Protein % = % Nitrogen× 6.25

Detection of ash

Firstly porcelain dishs was washed and weighed. 1.0 g of each sample were weighed and placed in the porcelain dishs. The samples were charred on the flame. Placed the sample in the muffle furnace at temperature 525ºC. After complete burning white color was formed. Samples were removed from furnace and were weighed.

$$\text{\% Ash} = \frac{\text{Weight of ash}}{\text{weight of sample}} \times 100$$

Determination of crude fat

7.3178 g of grounded *capsicum annum* were taken in the thimble made of filter paper. Then thimble was placed into the soxhlet extraction thimble. Weighed a cleaned and dried soxhlet extraction flask and added *n*-hexane as a solvent in the flask. Extracted the fat from the sample for 4.5 hours using n-hexane condensing at 5 to 6 drops per second in soxhlet extraction unit. Hexane was evaporated from the extraction flask after extraction. When no odor of hexane remained dried the flask in the oven for 30 minutes. Then it was cooled in the desiccator and was weighed. Weight of fat was determined.

$$\text{\% Fat} = \frac{\text{Weight of fat}}{\text{weight of sample}} \times 100$$

Determination of crude fiber

1 g dried defated each sample of *Capsicum annum* was weighed in an aluminum dish. Sample was placed in the di gestion flask. 100 mL of 1.25% H_2SO_4 solution was added in each flask. Both Flask was connected with air condenser and boiled for 30 minutes. Contents of flask were filtered through linen cloth in fluted funnel. Residue was washed with distilled water till it was free from acid. Then residue was transferred again the into two digestion flasks and added 100 mL of 1.255% NaOH. Flask was connected with air condenser and continued boiling for 30 minutes. Contents of flask were washed with distilled water and filtered them with filter paper. Contents were dried in the oven. Crucible was washed, dried in the oven and was cooled. Crucible and contents were weighed. It was denoted as W1.Contentof the crucible was ignited firstly over low flame until charred and then in furnace at 550ºC.Then it was weighed again. It was denoted as W_2. Reported the loss in weight (W_1-W_2).

$$\text{Crude fiber} = \frac{W1 - W2}{\text{Weight of sample}} \times 100$$

RESULTS AND DISCUSSIONS

Oleoresin was extracted from red chilli (*capsicum annum*) through Soxhlet apparatus by using polar and non-polar solvent combination. Solvent was removed and oleoresin was collected, have deep red color and strong pungency. It was stored in the amber colored bottle for further evaluation. The meal was also collected which was light brown in color and having very faint pungency.

Presence of protein was identified by kjheldhal method. The percentage of protein in meal of *capsicum annum* was 2.94% and 2.51% for round shaped and long shaped chilli or pepper calculated by multiplying protein factor with percent nitrogen. Simple digestion, distillation and titration processes were performed in the protein test. Presence of protein in the oleoresin of *capsicum annum* was identified by kjheldhal method.

Crude fat in meal of *capsicum annum* was determined by using Soxhlet type apparatus. Hexane was used as solvent in this process. Extraction of fat was continued for 5 hours. The percentage of fat was 2.99% and 2.71% for Round and long shaped *capsicum annum*. Ash test was performed for the determination of ash. The sample was charred on flame till the sample was turned in to the black color. Then it was placed in the furnace. The percentage of ash for round long shaped chilli was 5.17% and 4.13% which is very near to reported value that is 5-5.88%.

Fiber test of meal of *capsicum annum* was performed for the determination of fiber content in *capsicum annum*. The defated sample placed in the round bottom flask and added 100 mL of 1.25% sulphuric acid and boiled for 30 minutes. Then solutions were filtered and washed with distilled water and added the residue in the flask again. Then added 100 mL of 1.25% sodium hydroxide in the flask and continued boiling for 30 minutes. Solution was filtered and washed with distilled water. Residue was dried in oven and was weighed. Then the ash test was performed and calculated the fiber content in meal of *capsicum annum*. The percentage of fiber obtained round and long shaped *capsicum annum* was 10.55% and 11.03% Moisture test of meal of *capsicum annum* was performed to check the moisture content in the *capsicum annum*. Powdered sample of *capsicum annum* was taken in the aluminum dishes and then it was weighed. Aluminum dishes were placed in the oven for 5 hours to remove the moisture.

Loss in weight was reported as percent moisture. The percentage of moisture in the meal of *capsicum annum* round shaped and long shaped *capsicum annum* was 4.66% and 6.37%.

Proximate analysis of meal of *Capsicum annum* (Round shaped variety) The results of proximate analysis of round pepper are followed.

Table 4.1: Proximate analysis meals of *capsicum annum* (Round shaped variety).

Experiment	Test performed	*Capsicum annum* (Round)
1	Moisture test (%)	4.66
2.	Dry Mass (g)	95.33
2	Protein test (%)	2.94
3	Ash test	5.17
4	Fat test	2.9995
5	Fiber (%)	10.55

Proximate analysis shows that round *capsicum annum* contained many components such as protein, fat, crude fiber, and ash. Moisture was also present in *capsicum* species.

Proximate analysis of meal of *capsicum annum* (Long shaped variety)

Proximate analysis shows that long *capsicum annum* contained many components such as protein, fat, crude fiber, and ash. Moisture was also present in *capsicum* species. The results are followed.

Table 4.2: Proximate analysis meals of *capsicum annum* (Long shaped variety).

Experiment	Test performed	*Capsicum annum* (Long)
1	Moisture test (%)	6.37
2.	Dry Mass (g)	93.6213
2	Protein test (%)	2.51
3	Ash test	4.13
4	Fat test	2.7125
5	Fiber (%)	11.03

Both varieties of capsicum annum i.e. round variety and long variety are rich in protein, fiber and fat, which are valuable nutrients. Owing to these results, it can be assumed that meal of capsicum annum varities can be consumed for cooking purpose or inany other form of human food.[11]

CONCLUSION

Oleoresin from two varieties (Round and long) of *Capsicum annum* have been extracted by using *n*-hexane and ethyl acetate through Soxhlet apparatus. Proximate analysis i.e. protein content, fiber content, moisture content and fat content has been determined. Moisture

contents, Dry mass, protein, Ash contents, fat and fiber in capsicum annum (round variety) were 4.66%, 95.33%, 2.94%, 5.17 %, 2.99 %, 10.55% while in capsicum annum (long variety) were 6.37%, 93.62%, 2.51%, 4,13 %, 2.7%, and 11.03% respectively. The results revealed that these verities are rich in nutritional contents and are valuable for human consumption. The application of phytochemicals for human health, food preservation and safety are promising. Nevertheless, the required doses, the processing time of the applied non-thermal method and the sensory properties should be evaluated in each food. This is an avenue of future research of other non-pungent Capsicum constituents that deserve further studies.

REFERENCES

1. Dekkers, J. C., van Doornen, L. J., & Kemper, H. C. The role of antioxidant vitamins and enzymes in the prevention of exercise-induced muscle damage. Sports medicine, 1996; 21(3): 213-238.
2. Hervert-hernandez, D., Sonia, G., Sayago-Ayerdi. & Goni, I. Bioactive Compounds of Four Hot Pepper Varieties (*Capsicum annuum L.*), Antioxidant Capacity, and Intestinal Bioaccessibility. J Agric Food Chem, 2010; 58: 3399–3406.
3. Kappel, V. D., Costa, G. M., Scola, G., Silva, F. A., Landell, MF., Valente, P., Souza, D. G.,Vanz, D. C., Reginatto, F. H. & Moreira, G. C. F. Phenolic Content and Antioxidant and Antimicrobial Properties of Fruits of *Capsicum baccatum* L. var. *pendulum* at Different Maturity Stages. *Journal of Medicinal Food,* 2008; 11(2): 267–274.
4. Kim, I. K., El-Aty, A. A., Shin, H. C., Lee, H. B., Kim, I. S., & Shim, J. H. Analysis of volatile compounds in fresh healthy and diseased peppers (Capsicum annuum L.) using solvent free solid injection coupled with gas chromatography-flame ionization detector and confirmation with mass spectrometry. Journal of pharmaceutical and biomedical analysis, 2007; 45(3): 487-494.
5. Kulisic, T., Radonic, A., Katalinic, V., & Milos, M. Use of different methods for testing antioxidative activity of oregano essential oil. Food chemistry, 2004; 85(4): 633-640.
6. Materska, M., & Perucka, I. Antioxidant activity of the main phenolic compounds isolated from hot pepper fruit (Capsicum annuum L.). Journal of Agricultural and Food Chemistry, 2005; 53(5): 1750-1756.
7. Melgar-Lalanne, G., Hernández-Álvarez, A. J., Jiménez-Fernández M. & Azuara, E. Oleoresins from *Capsicum* spp.: Extraction Methods and Bioactivity. *Food Bioprocess Technol*, 2017; 10: 51–76.

8. Minguez-Mosquera, M. I. & Hornero-MBndez, D. Separation and Quantification of the Carotenoid Pigments in Red Peppers *(Capsicum annuum* L.), Paprika, and Oleoresin by Reversed-Phase HPLC, *J Agri Food Chem,* 1993; *41:* 1616-1620.
9. Oboh, G., Puntel, R. L., & Rocha, J. B. T. Hot pepper (Capsicum annuum, Tepin and Capsicum chinese, Habanero) prevents Fe2+-induced lipid peroxidation in brain–in vitro. Food chemistry, 2007; 102(1): 178-185.
10. Pino, J., Sauri-Duch, E., & Marbot, R. Changes in volatile compounds of Habanero chile pepper (Capsicum chinense Jack. cv. Habanero) at two ripening stages. Food chemistry, 2006; 94(3): 394-398.
11. Van Ruth, S., Boscaini, E., Mayr, D., Pugh, J., & Posthumus, M. Evaluation of three gas chromatography and two direct mass spectrometry techniques for aroma analysis of dried red bell peppers. International Journal of mass spectrometery, 2003; 223(15): 55-65.