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Original Research Article

Nutritional evaluation of *Cucumic callosus* - an underutilized crop of semi arid region of Haryana

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Abstract

Cucumus callosus, commonly known as wild melon or "kachri" in India, is a member of the ***Cucurbitaceae*** family. This study aims to evaluate the nutritional value of this underutilized crop. Kachri fruits vary in size, ranging from small to large, and are oval-shaped with a yellowish-green color. They start off sour and become sweet when ripe. These fruits are predominantly found in semiarid regions. The research findings indicate that the Mesocarp of *Cucumis callosus* contains a high protein content of 38.12% and an ash content of 9.02%. Recent studies have highlighted the health benefits of consuming wild edible plants, focusing on their antioxidant activity, which is essential for preventing and managing diseases. The antioxidant activity of *Cucumis callosus* ranges from 13.96 ± 0.47% to 31.68 ± 2.66%. Additionally, the total phenol content (TPC) is measured at 931.5 µg GAE/g original weight and 683 µg GAE/g original weight.

Keywords

Cucumis calosus, kachri, mesocarp, DPPH, methanolic extract, physico-chemical, nutritive value

Introduction

Cucumis callosus is a species of cucumber that belongs to the family cucurbitaceae. The plant produces edible fruits and is often used in traditional medicine for its various health benefits [1]. Although it is utilized in form of vegetables but ripe fruit is also consumed in India both at times of scarcity and on regular days. Vitamin C (19.99mg/100gm) is known to be present in *Cucumis* fruits [2].

Fruits and vegetables present a unique difficulty when drying because they are typically heat sensitive. Dehumidification must be done under carefully regulated settings. Due to the expensive cost and high level of skill required in the artificially drying system, sun drying is becoming more popular for preserving vegetables. However, in light of the present issues with micronutrient deficiencies, nutrient conservation is unquestionably essential [2].

Morphology

It is an annual plant that typically grows at a height of 40-80 cm creeping vine. It has small yellow flowers that are usually 2 cm in diameter. The fruit of it is edible and cheaper. Having leaves which are about 2-5 cm in different lobular structures [3]. The quality of *Cucumis callosus* depends on the effective rate of drying to minimize nutritional loss. The good quality dried *Cucumis callosus* is obtained to keep the slice thickness of 5 mm and it should be dried at 60°C temperature as shown in figure1 [1].

Origin and Distribution: This is a native to south Asia, including Nepal, India, Bangladesh, and other parts of Asia, such as Thailand, China and Indonesia. While in India it is widely distributed across many states, including Rajasthan, Haryana, Uttar Pradesh, West Bengal, Assam and Karnataka [4].

According to reports, *Cucumis sativus* and *C. hystrix* are among the species that exhibit diversity [5]. A single variety, *Cucumis sativus* makes up the core gene pool of *Cucumis sativus*, while *Cucumis* hystrix makes up the secondary gene pool. Several researchers have emphasized the need of collecting *Cucumis* species from India based on the genetic variability distribution and genetic erosion status [6] [7].

The genetic variation of the cucurbits in North Western India, particularly in the Aravali ranges,is rich, but it is under danger due to the spread of newly released types [8].

Significance of study

Cucumis callosus is a species which is wild and is belong to the Cucurbitaceae family. It was studied that vitamins and minerals are found in moderate amount in this fruit [9]. The secondary metabolites are present widely which are proven for therapeutic properties. Perishable crops above 20% promote food security all over world are dried to increase shelf life. It was studied that this fruit shows antioxidant properties and possess bioactive compounds [10].

In India the fruit and fruit powder is used in making curries and different items such as, pickles,dosa, chutney, vegetables, salad etc [11].

In this study the objectives were taken by considering the medicinal value of mesocarp of kachri fruit, the study entitled **"Nutrition evaluation of Cucumis *callosus* an underutilizedcrop of semiarid region of Haryana**".

Objective

- To study the nutritional parameter of mesocarp of *Cucumis callosus*.
- To study the physiochemical, functional and antioxidant properties of mesocarp of *Cucumis callosus*

Research Methodology

Sample collection: Kachri fruit were taken from the local market of Mahendergarh, Haryana to conduct the study, which was used further to form the extract.

Extract Preparation

Processing: After collection of Kachri fruit, washing then cutting of the sample collected was done, to extract the mesocarp of the fruit. Mesocarp is then cut into 5 mm small slices. Further it was kept for 6 hours in hot air oven at 60°C temperature, in a petri plate for complete moisture loss.The dried mesocarp was grinded to form the powdered form

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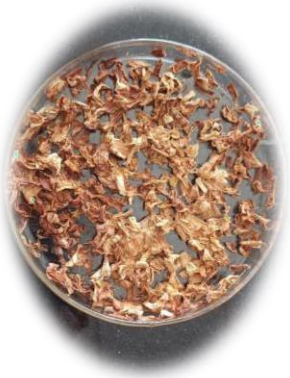
and then stored in an air tight container in dark, to perform the experiments further as shown in figure 1.

Collection of fruit wash

Extraction of Mesocarp

Hot air oven the sample

Grinding to form powder



Dried Mesocarp

Figure 1 Sample preparation from kachri fruit (*Cucumis callosus)*

Physical parameters of Kachri fruit

Length & Breadth: Length and breadth of the fruit was measured by vernier caliper scale.

Functional parameter of mesocarp of *Cucumis callosus*

Water absorption capacity: A clean empty falcon was taken.1gm of sample (Ws) was mixed with 10ml of distilled water in that empty falcon was weigh down (W1). This was further mixed for 4-5 minutes on vortex. The sample was kept aside for 3-4 hours for

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diffusion. After that, for 25 minutes at the speed of 2900 revolution per minute on 25°C, the sample was centrifuged. Then the mesocarp samplewas air dried inside hot air oven at 55°C. The supernatant was discarded and weight of the falcon is noted down (W2).

$$WAC\ (\%) = \frac{W2 - W1}{Ws} \times 100$$

Where, W1 = weight of the falcon + sample, W2 = weight of the falcon tube + sediment

Ws = weight of the sample

Oil absorption capacity: A clean empty falcon was taken.1gm of sample (Ws) was mixed with 10ml of soyabean oil in that empty falcon was weigh down (W1). This was further mixed for 4-5 minutes on vortex. The sample was kept aside for 3-4 hours for diffusion. After that, for 25 minutes at the speed of 2900 revolution per minute on 25°C, the sample was centrifuged. Then the sample mesocarp was air dried inside hot air oven at 55°C. The supernatant was discarded and weight of the falcon is noted down (W2).

$$OAC\ (\%) = \frac{W2 - W1}{Ws} \times 100$$

Where, W1 = weight of the falcon tube + sample W2 = weight of the falcon tube + sediment,

Ws = weight of the sample

Emulsion activity: A clean empty falcon was taken.1gm of sample was mixed with 10ml of distilled water and 10ml of soyabean oil in that empty falcon. After that, for 10 minutes at the speed of 2000 revolution per minute on 25°C, the sample was centrifuged. Emulsion activity was further measured by the following formula.

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$$EA\ (\%) = \frac{\text{Emulsified layer height}}{\text{Total content in falcon height}} \times 100$$

Emulsion stability: A clean empty falcon was taken.1gm of mesocarp sample was diluted with 10ml of distilled water and 10ml of soyabean oil in that empty falcon. After that, for 10 minutes at the speed of2000 revolution per minute on 25°C, the sample was centrifuged. Then for 30 minutes, the sample was kept in water bath at 80°C, cooled for 15 minutes under tap water. Centrifugation for 10 minutes at the speed of 2000 revolution per minute on 25°C was repeated again. Emulsion stability was further measured by the following formula.

$$ES\ (\%) = \frac{\text{Emulsified layer height}}{\text{Total content in falcon height}} \times 100$$

Proximate composition of mesocarp of *Cucumis callosus:* In this part of the study, moisture, ash, crude fibre, acid insoluble ash, protein and fat contents were estimated using standard methods of AOAC, 2000 [12]. Carbohydrate content was calculated by difference of other proximate components from 100.

Antioxidant activity (%Inhibition) of mesocarp of *Cucumis callosus:* It was estimated by DPPH method.

Bioactive compounds of mesocarp of Cucumis callosus: In this total phenolic compounds and total flavonoids were determined by Follin's Ceocalteu method.

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Results and Discussion

The present study was directed to check the nutritional parameter and the physiochemical, functional and antioxidant properties of mesocarp of *Cucumis callosus*. Results have been divided under following subheadings -

1. Physical parameter of kachri fruit

Physical parameters Color, shape, length, breadth and weight of kachri fruit *Cucumis callosus* is presented in table 1.

Parameters	Mean value ± SD
Colour	Light green and yellowish with dark greenspots.
Shape	Round and oval
Length(cm)	1.5 ± 0.3
Breadth(cm)	4.5 ± 1.5
Weight(gm)	45 5

Table 1: Parameter of kachri fruit

2. **Yield percentage:** The yield percentage of Mesocarp powder is obtained from half kg of *Cucumis callosus* is 125.43 ± 5.6 gm.

3. Functional parameter of mesocarp of *Cucumis callosus*

From table 2, it is evident that the water absorption capacity i.e. weight of solvent (water) absorbed by mesocarp in saturated state over the dry mesocarp weight was 279.66 ± 1.25%. Where the oil absorption capacity was117 ± 1.63%. Emulsion activity shown table 2 was 25.57 ± 0.35%. Where emulsion stability was observed as 23.33 ± 0.39%. The percentage decrease is may be due to high temperature treatment of mesocarp sample.

Functional parameters	Mean value ± SD
Water absorption capacity (%)	279.66 ± 1.25
Oil absorption capacity (%)	117 ± 1.63
Emulsion activity (%)	25.57 ± 0.35
Emulsion stability (%)	23.33 0.39

Table 2: Functional parameter of mesocarp of *Cucumis callosus*

4. Proximate composition of mesocarp of *Cucumis callosus*

Proximate content of the mesocorp of Cucumis callosus was seen in table 3, in which it was observed that the **Moisture content** in the fresh mesocarp (*Cucumis callosus*) was 5.18 ± 0.02%. Where the **Ash content** in the fresh mesocarp sample was noted as 9.02 ± 0.1%. The crude fiber content was 8.01 ± 0.1%, while the Acid insoluble ash was 0.9 ± 0.1%. Protein content of the mesocarp sample was 38.12 ± 4.36 mg/1gm. The amount of **crude fat** present in the mesocarp (*Cucumis callosus*) sample was 24.32 ± 0.01% as shown in table 3 below -

Parameters	Mean value ± SD
Moisture (%)	5.18 ± 0.02
Ash (%)	9.02 ± 0.1
Crude Fiber (%)	8.01 ± 0.1
Acid insoluble ash (%)	0.9 ± 0.1
Protein (%)	38.12 ± 4.36
Fat (%)	24.32 ± 0.01
Carbohydrate (%)	32.68 ± 5.61

Table 4.3: Proximate composition of mesocarp of *Cucumis callosus*

5. Antioxidants as % inhibition of DDPH:

Antioxidants were noted as % inhibition of DPPH at different concentration rises from 13.96 ± 0.47% to 31.68 ± 2.66%.

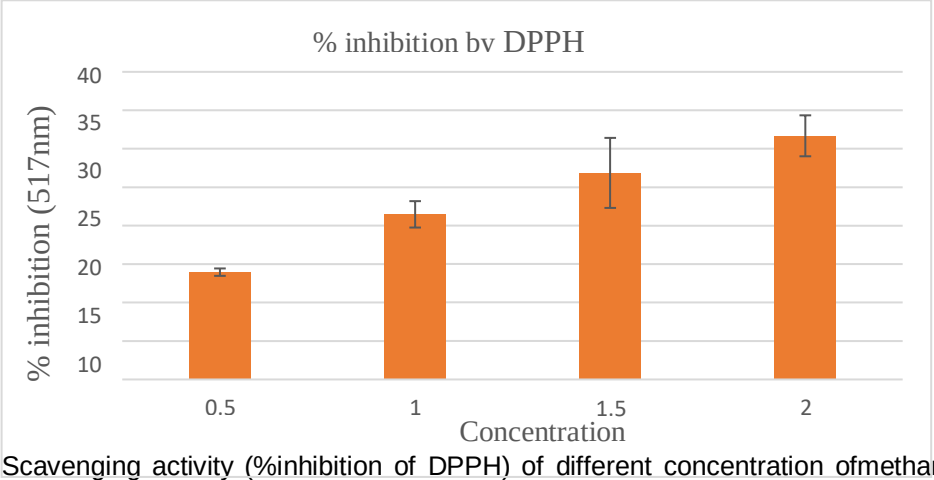
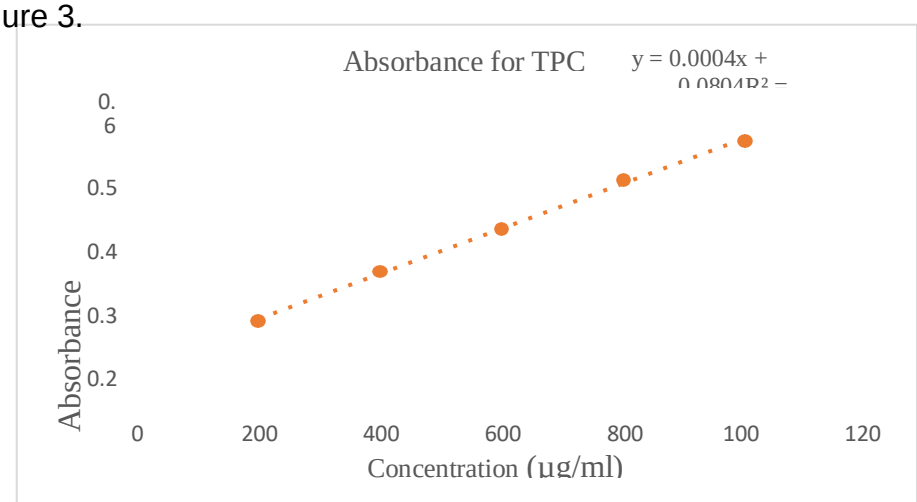


Figure 2: Scavenging activity (%inhibition of DPPH) of different concentration ofmethanolic extract of mesocarp (*Cucumis callosus*)

6. Bioactive compounds of mesocarp of *Cucumis callosus*

6.1 Total Phenolic content:

The extraction methods and solvents used dissolve the natural components present in the plants. These components can be categorized as either polar or non-polar. Phenolic compounds, due to their hydroxyl group, are more readily dissolved in polar organic solvents. Methanol was chosen as the extraction solvent as a result. Mesocarp (*Cucumis callosus*) has a total phenol contents (TPC) of 931.5 µg GAE/g original weight from figure 3.



6.2 Total flavonoid content:

Flavonoids are secondary metabolic products with antioxidant activity, and the amount and location of free OH groups determine how potent they are. Mesocarp (Cucumis callosus) has a total phenol contents (TPC) of 683 µg GAE/g original weight as shown in figure 4.

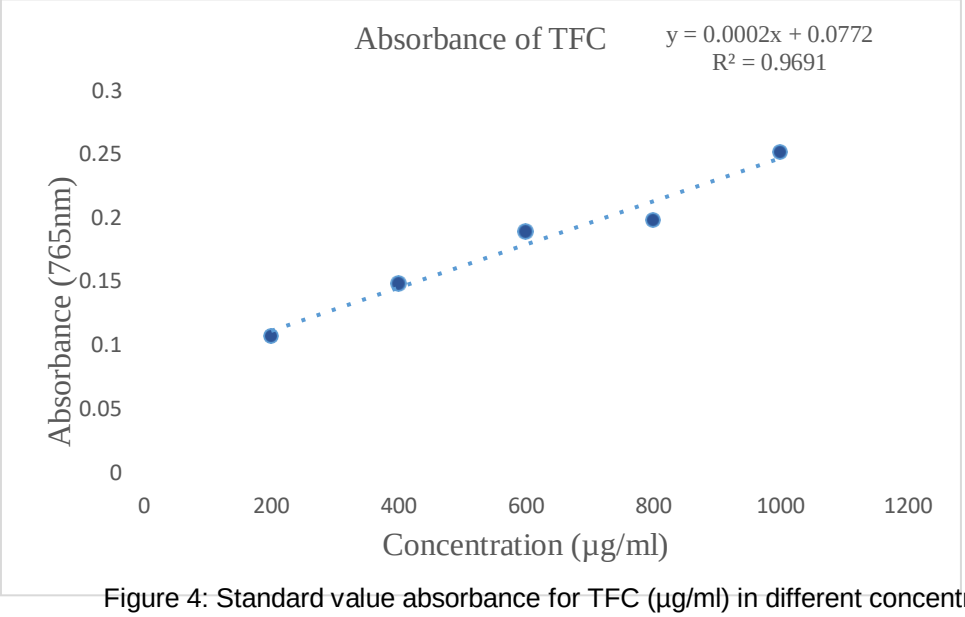


Figure 4: Standard value absorbance for TFC (µg/ml) in different concentration

Conclusion

The research reveals that the Mesocarp of *Cucumis callosus* contains a high protein content of 38.12% and an ash content of 9.02%. Recently, there has been increasing interest in the health benefits of consuming wild edible plants. Numerous studies have focused on the plant's antioxidant activity, which plays a crucial role in preventing and managing diseases. Antioxidants are compounds that can neutralize harmful molecules called reactive oxygen species in the body. These species are produced naturally during cellular metabolism but can increase due to factors like pollution, stress, and a poor diet. By consuming foods rich in antioxidants, one can counteract the negative effects of reactive oxygen species and lower the risk of diseases associated with oxidative stress. Evaluating the antioxidant activity of wild edible plants has shown that higher levels of phenolic and flavonoid compounds can serve as valuable sources of

natural antioxidants. These compounds possess potent antioxidant properties, making the consumption of wild plants a potential strategy for reducing oxidative stress and related diseases.

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