



ORIGINAL RESEARCH PAPER

Botany

EFFECT OF VARIOUS STORAGE CONDITIONS ON THE NUTRITIONAL PROPERTIES OF SOME CUCURBITS

KEY WORDS: Nutraceuticals, Vitamin C, Dietary fibre, Dietetics, Storage, Cucurbits

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ABSTRACT

Cucurbits belonging to family Cucurbitaceae or the gourd family of flowering plants, are very important nutritionally. After harvest, storing of these cucurbits in optimal conditions is important to ensure that the nutrients are not lost. In the present investigation, an attempt was made to study the effect of various storage conditions on the nutrient content of three most commonly growing and easily available cucurbits, *Cucumis sativus* L. (Cucumber), *Momordica charantia* L. (Bitter gourd) and *Luffa acutangula* L. (Shiradi, Luffa). It was observed that protein content, vitamin C, iron and crude fiber content in all the cucurbits studied showed a gradual reduction with increase in days of storage. Temperature of storage was also found to be an important factor for the nutrients to be maintained in Cucurbits. Storage at 15 °C was found to be better as the decrease in nutrients was found to be minimum when the fruits were stored at 15 °C compared to storage at room temperature and 5 °C.

INTRODUCTION

Cucurbits are prostrate herbs bearing tendrils. They are nutritionally rich with high medicinal value. The nutritional quality of any Cucurbit is depending upon the presence of vitamins, fibers, carbohydrates, proteins and other nutrients. Storing the cucurbits after harvest in optimal conditions is very important. The ideal storage condition for *Cucumis* is reported to be around 50 to 54°F (Wenjing Guan, 2017). Cucurbits are found to be sensitive to chilling. It is reported that chilling injury can develop when the fruits are stored below 50°F for more than 2 or 3 days. Devendra *et al.* (2011), have observed variation in the cucurbitacin content in cucurbits with respect to time and temperature. The improper storage of cucurbits can change its bioactive compounds as well as its nutrients according to storage conditions (e.g., time and temperature). Therefore, it is necessary to store them in the most appropriate storage conditions. For the present work the effect of storage on three commonly cultivated cucurbits were studied.

MATERIAL AND METHODS

Plants selected

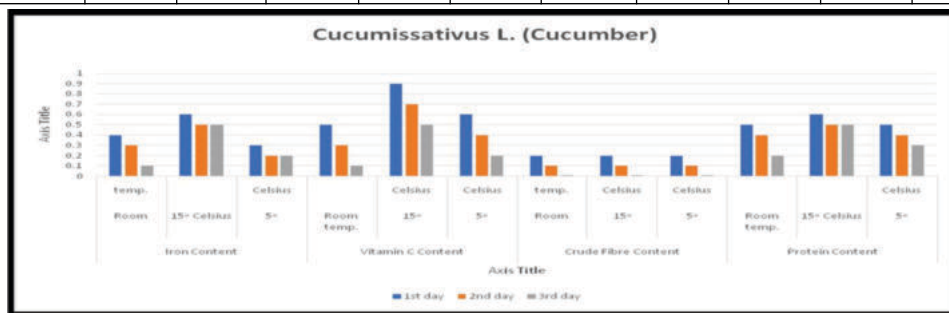
- 1) *Cucumis sativus* L. (Cucumber)
- 2) *Momordica charantia* L. (Bitter gourd)
- 3) *Luffa acutangula* L. (Shiradi, Luffa)

Storage conditions

The cucurbit fruits were stored under the following conditions

Table 1: Effect of different storage conditions and storage period on nutrient content of *Cucumis sativus* L. (mg/g)

<i>Cucumis sativus</i> L. (Cucumber)													
Sr. No.	Storage Period	Iron Content			Vitamin C Content			Crude Fibre Content			Protein Content		
		Room temp.	15° Celsius	5° Celsius	Room temp.	15° Celsius	5° Celsius	Room temp.	15° Celsius	5° Celsius	Room temp.	15° Celsius	5° Celsius
1)	1 st day	0.4 ± 0.1	0.6 ± 0.5	0.3 ± 0.1	0.5 ± 0.5	0.9 ± 0.6	0.6 ± 0.3	0.2 ± 0.7	0.2 ± 0.7	0.2 ± 0.6	0.5 ± 0.5	0.6 ± 0.3	0.5 ± 0.4
2)	2 nd day	0.3 ± 0.2	0.5 ± 0.6	0.2 ± 0.5	0.3 ± 0.6	0.7 ± 0.7	0.4 ± 0.3	0.1 ± 0.5	0.1 ± 0.6	0.1 ± 0.5	0.4 ± 0.5	0.5 ± 0.5	0.4 ± 0.5
3)	3 rd day	0.1 ± 0.4	0.5 ± 0.1	0.2 ± 0.1	0.1 ± 0.4	0.5 ± 0.7	0.2 ± 0.4	0.01 ± 0.5	0.01 ± 0.6	0.01 ± 0.5	0.2 ± 0.2	0.5 ± 0.2	0.3 ± 0.6



Values given are Mean ± SD

for a definite period of time before analyzing them.

- Room Temperature-** The fruits were kept at room temperature for one, two and three days and then they were analysed for the different parameters and the data was recorded.
- 15 °C-** The fruits were stored at a temperature of 15 °C for one, two and three days and then they were analysed for the different parameters and the data was recorded.
- 5 °C-** The fruits were stored at a temperature of 5 °C for one, two and three days and then they were analysed for the different parameters and the data was recorded.

Parameters Studied

- Iron content-** The Iron content of the cucurbits, stored under different conditions was analysed using **Farrar (1935)** method
- Vitamin C-** The Vitamin C content of the cucurbits, stored under different conditions was analysed using **DCPIP** method.
- Protein content-** The protein content of the cucurbits stored under different conditions was analysed using **Lowry's** method.
- Crude fibre content-** The crude fibre content of the cucurbits, stored under different conditions was analysed using **Acid Base** method.

Table 2: Effect of different storage conditions and storage period on nutrient content of *Luffa acutangula* L. (mg/g)

<i>Momordica charantia</i> L. (Bitter Gourd)													
Sr. No.	Storage Period	Iron Content			Vitamin C Content			Crude Fibre Content			Protein Content		
		Room temp.	15° Celsius	5° Celsius	Room temp.	15° Celsius	5° Celsius	Room temp.	15° Celsius	5° Celsius	Room temp.	15° Celsius	5° Celsius
1)	1 st day	18± 0.2	20± 0.2	18± 0.2	6± 0.4	8± 0.7	7± 0.4	1.4± 0.7	1.8± 0.6	1.6± 0.7	0.7± 0.3	0.9± 0.4	0.8± 0.4
2)	2 nd day	16± 0.6	18± 0.1	17± 0.2	4± 0.6	6± 0.5	5± 0.3	1.2± 0.7	1.4± 0.7	1.4± 0.7	0.6± 0.3	0.8± 0.4	0.7± 0.3
3)	3 rd day	14± 0.2	17± 0.1	17± 0.2	3± 0.6	5± .30	4± 0.3	1.0± 0.6	1.2± 0.6	1.2± 0.7	0.4± 0.4	0.8± 0.4	0.6± 0.8

Values given are Mean ± SD

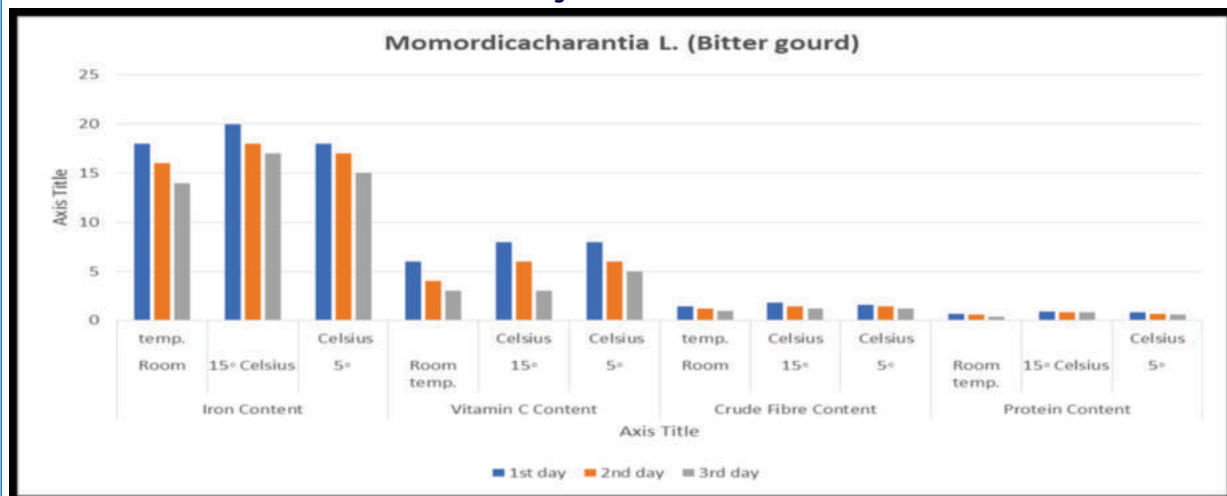
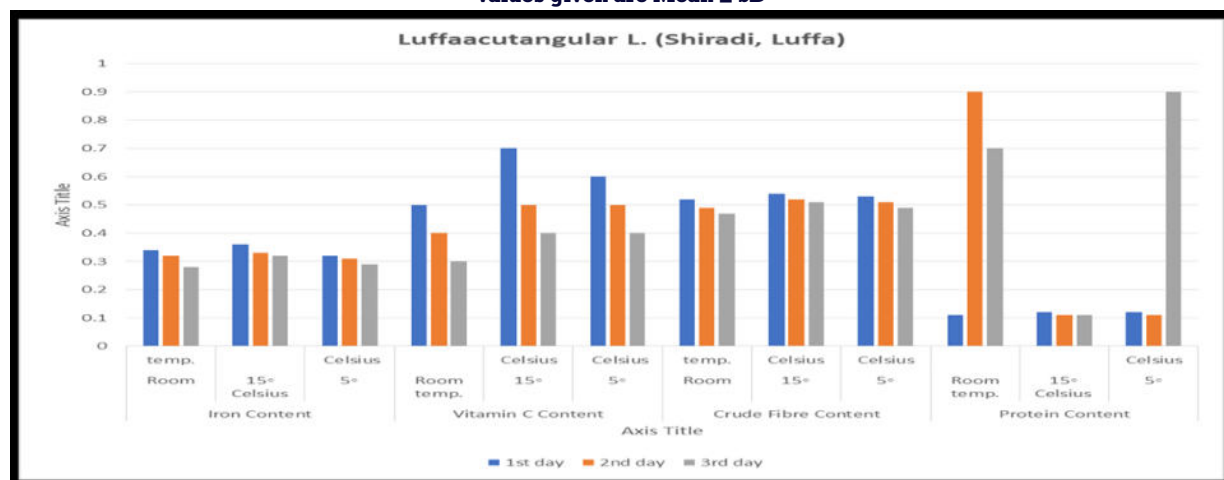


Table 3: Effect of different storage conditions and storage period on nutrient content of *Luffa acutangula* L. (mg/g)

<i>Luffa acutangula</i> L. (Shiradi, Luffa)													
Sr. No.	Storage Period	Iron Content			Vitamin C Content			Crude Fibre Content			Protein Content		
		Room temp.	15° Celsius	5° Celsius	Room temp.	15° Celsius	5° Celsius	Room temp.	15° Celsius	5° Celsius	Room temp.	15° Celsius	5° Celsius
1)	1 st day	0.34± 0.3	0.36± 0.3	0.32± 0.2	0.5± 0.4	0.7± 0.4	0.6± 0.2	1.4± 0.7	1.8± 0.6	1.6± 0.7	0.11± 0.3	0.12± 0.4	0.12± 0.4
2)	2 nd day	0.32± 0.2	0.33± 0.4	0.31± 0.3	0.4± 0.3	0.5± 0.4	0.5± 0.4	1.2± 0.7	1.4± 0.7	1.4± 0.7	0.9± 0.5	0.11± 0.5	0.11± 0.4
3)	3 rd day	0.28± 0.2	0.32± 0.3	0.29± 0.4	0.3± 0.0	0.4± 0.2	0.4± 0.3	1.0± 0.6	1.2± 0.6	1.2± 0.7	0.7± 0.5	0.11± 0.5	0.9± 0.5

Values given are Mean ± SD



RESULTS AND DISCUSSIONS

In the present investigation it was observed that the protein content, vitamin C, iron and crude fiber content in all the cucurbits studied showed a gradual reduction with increase in days of storage. The decrease in nutrients was found to be minimum when the fruits were stored at 15°C compared to room temperature and 5°C.

Maximum iron content was observed in the fruits of *Momordica charantia* L compared to fruits of *Cucumis sativus* L and *Luffa acutangula* L. The decrease in iron content was from 18 to 14 mg/g in the fruits of *Momordica charantia* stored at

room temperature after one day of storage and three days of storage respectively (Table 1). Chunduri *et al.* 2013 has recorded 177.3 mg/100g of iron in *Momordica charantia* L fruits collected from Mumbai. In *Cucumis sativus* L. reduction in iron content observed was from 0.4 to 0.1 mg/g when stored at room temperature, The loss was less when the fruits were stored at 5°C. Rahman *et al.* 2006 has recorded 1.3mg/100g of iron in *Cucumis sativus* fruits. *Luffa acutangula* L. showed a decrease in iron content from 0.36 to 0.28 mg/g when stored at room temperature for one day and three days respectively (Table 1). Bakare *et al.* 2010 have also worked on iron content in cucurbits. Essien *et al.* (2016) have stated that *Cucumis sativus*

are among the most water rich foods and contain protein (0.82%), Vitamin C content also showed a reduction in all the fruits studied due to storage. The reduction was found to be maximum in *Cucumis sativus* L fruits when stored in room temperature. The amount of vit c in *Cucumis sativus* L after one day of storage at room temperature was found to be 0.5mg/g but after 3 days of storage at room temperature it reduced to 0.1mg/g.(Table2.)

Maximum crude fibre content was observed in the fruits of *Momordica charantia* L compared to fruits of *Cucumis sativus* L and *Luffa acutangular* L. The amount of crude fibre present after one day of storage at room temperature in *Momordica* was found to be 1.4% while after one day of storage at 15 °C it was found to be 1.8% (Table 4)

CONCLUSION

The nutritional quality of Cucurbits depends upon the presence of vitamins, fibers, carbohydrates, proteins and other nutrients.

Cucumis sativus L., *Momordica charantia* L. and *Luffa acutangular* L. when stored under different temperatures showed variation in the quantity of vitamin C, iron content, crude fibers and protein content. As the days of storage increased the nutrient content reduced.

Temperature is an important factor in storage, for the nutrients to be maintained in Cucurbits. Storage of cucurbits at 15 °C is better than storage at room temperature and 5 °C because maximum nutrients were found to be retained in storage at 15 °C.

REFERENCES

1. Bakare, R.I., Magbagbeola, O.A., Akinwande, A.I. and Okunowo O.W. (2010). Nutritional and chemical evaluation of *Momordica charantia*. Journal of Medicinal Plants Research. Vol 4(21) pp 2189-2193.
2. Chunduri, J. R. (2013). Antioxidant and nutritional analysis of edible cucurbitaceae vegetables of India. International Journal of Bioassays Vol. 2(08), 1124-1129.
3. Devendra N.K., Attard, E. G., Raghunandan, D., Seetharam, Y.N. (2011). Study on seasonal variation on the content of Cucurbitacin of various vegetative parts of *Momordica charantia* L., *cucumerina* L. var. *cucumerina*, International Journal of Plant Research. 1(1):25-28.
4. Essien, A. D., Ogbonna, O. J., Abe, P. N., Nnaoma, I. E. and Omoregha, C.U. (2016). Comparative studies of the phytochemistry, proximate analysis, mineral and vitamin compositions of the methanol leaf extracts of *Cucumis sativus* L. and *Daucus carota* L. International Journal of Pharmacological Research. Vol 6 (8) pp 282-285.
5. Farrar, G.E, JR (1935), The determination of iron in biological material J. Biol. chem 110, 685-694
6. Lowry, O.H., N.J. Rosebrough, A.L. Farr, and R.J. Randall (1951) Protein Measurement with the Folin Phenol Reagent. J. Biol. Chem. 193:265-275
7. Rahman, A.H.M.M., Anisuzzaman M., Ahmed Ferdous, Rafiqul I. A.K.M. and Naderuzzaman A.T.M. (2008). Study of nutritive value and medicinal uses of cultivated cucurbits. J. Applied Sci. Res., 4:555-558.
8. Wenjing Guan (2017). vegetable crops hotline, Purdue university