



Changes in Chemical Composition of Bottle Gourd (*Lagenaria siceraria* Mol. Standl.) Fruits cv. Samrat During Maturation

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Abstract

Bottle gourd (*Lagenaria siceraria* Mol. Standl.) is an important vegetable crop of world. It is a rich source of vitamins. Fruit maturity stage affects physico-chemical parameters and ultimately affects quality. An experiment was conducted to view the effect of different maturity stages on chemical composition of bottle gourd fruits. Changes in chemical properties of bottle gourd fruits were analyzed at different maturity stages of plant. The observations were performed on the fruits from 65 days after sowing (M₁), 70 days after sowing (M₂), 75 days after sowing (M₃) and 80 days after sowing (M₄). The maturity of bottle gourd fruits measured by decreased moisture content, reducing sugars, non-reducing sugars, chlorophyll content, carbohydrates and phosphorus content while fiber content, calcium content, vitamin C and total soluble solids was found to be increased with advancement of maturity stages during *kharif* and summer.

Key words : Bottle gourd, maturation, chemical composition.

Introduction

Bottle gourd (*Lagenaria siceraria* Mol. Standl.) is an important vegetable crop of tropical and subtropical region of the world belongs to family Cucurbitaceae and genus *Lagenaria*. The total area of *Lagenaria siceraria* cultivation in India is 157 thousand hectares with 2683 thousand tons of production (Anon, 2018). Besides, *Lagenaria siceraria* has many health and nutritional on dry weight basis g per 100 g of *Lagenaria siceraria* reported moisture 94.5 g, fat 0.2 g, fiber 0.7 g, carbohydrate 3.75 g, calcium 12 mg, phosphorus 10 mg, iron 0.8 mg, thiamin 0.3 mg, riboflavin, 0.05 mg, niacin 0.3 mg, sodium 1.7 mg, potassium 87 mg, and vitamin C 12 mg (1). The *Lagenaria siceraria* fruits are rich source of vitamins B, ascorbic acid, pectin, various saponins, fatty oils and fatty alcohols (2, 3). The manufacturing of value added products of *Lagenaria siceraria* will also help to start small scale industries because the demand for these products is increasing now days. Maturity stage of fruits affects physico-chemical parameters of *Lagenaria siceraria* fruits. This ultimately affects quality. Hence, an experiment was conducted to view the effect of different maturity stages on chemical composition of bottle gourd fruits.

Materials and Methods

The field experiment was carried out during the year *kharif*-2015 and summer-2016 at Instruction cum Research Farm, Department of Horticulture, MPKV, Rahuri on 'Samrat' variety of *Lagenaria siceraria*

developed by Mahatma Phule Krishi Vidyapeeth, Rahuri with 3.0 x 1.5 m spacing of university recommendation. The experiment was laid out in Completely Randomized Design with five replications. The cultural and plant protection measures were carried out as per university recommendations. Harvesting of *Lagenaria siceraria* fruits was done at 65-70-75 and 80 days after sowing i.e. immature, mature and over mature stage named as M₁, M₂, M₃ and M₄ respectively and used for chemical analysis. To study the chemical analysis, edible part of *Lagenaria siceraria* fruit from different maturity stages was taken. Moisture and total soluble solids were estimated by the method described by (4, 5). However, reducing sugars, non-reducing sugars, titrable acidity, chlorophyll content, calcium, phosphorus, fiber, vitamin C by (6).

Results and Discussion

The *Lagenaria siceraria* fruits were harvested at different maturity stages i.e. M₁, M₂, M₃ and M₄ during *kharif* and summer seasons to analyse chemical composition. The *Lagenaria siceraria* fruits were cylindrical in shape in all maturity stages whereas colour was change from dark green to light green with advancement of maturity stages.

Chemical parameters studied showed significant difference with respect to maturity stages of fruit. The moisture content in *Lagenaria siceraria* fruits was found to be significantly decreased with increased maturity stages from M₁ to M₄ during *kharif* as 95.15 to 94.30 per cent and during summer as 95.13 to 94.28 per cent. The fiber content was increased with respect to maturity stages from M₁ to M₄ ranged between 0.44 to 0.81 g/100 g during

Table-1 : Effect of different maturity stages on chemical parameters of *Lagenaria siceraria* fruits.

Treatment	Moisture (%)		Fiber (g/100g)		Reducing sugars (%)		Non-reducing sugars (%)		Chlorophyll (mg/ml)		Vitamin C (mg / 100 g)	
	Kharif	Summer	Kharif	Summer	Kharif	Summer	Kharif	Summer	Kharif	Summer	Kharif	Summer
M1	95.15	95.13	0.44	0.44	3.68	3.69	6.61	6.62	5.56	5.52	7.72	7.73
M2	94.50	94.49	0.50	0.51	3.64	3.64	6.56	6.56	5.30	5.29	7.89	7.90
M3	94.47	94.46	0.69	0.69	3.44	3.44	6.35	6.35	4.28	4.27	8.45	8.47
M4	94.30	94.28	0.81	0.82	3.36	3.36	6.31	6.31	4.17	4.16	8.24	8.26
G. mean	94.61	94.59	0.61	0.62	3.54	3.53	6.45	6.46	4.83	4.81	8.08	8.09
S.E.±	0.00	0.00	0.006	0.003	0.009	0.01	0.001	0.001	0.003	0.007	0.005	0.029
C.D.at 5%	0.01	0.01	0.018	0.011	0.029	0.05	0.003	0.003	0.010	0.022	0.016	0.089

Table-1 : Contd....

Treatment	TSS (°Brix)		Carbohydrate (g/100g)		Phosphorus (mg/100g)		Calcium (mg/100g)	
	Kharif	Summer	Kharif	Summer	Kharif	Summer	Kharif	Summer
M1	3.29	3.30	2.53	2.52	11.68	11.69	18.64	18.65
M2	3.33	3.33	2.39	2.37	9.47	9.47	20.54	20.55
M3	3.35	3.36	2.16	2.14	9.23	9.24	21.45	21.46
M4	3.37	3.37	1.89	1.87	8.67	8.67	22.77	22.78
G. mean	3.33	3.34	2.24	2.23	9.76	9.77	20.85	20.86
S.E.±	0.01	0.01	0.005	0.005	0.001	0.001	0.001	0.001
C.D.at 5%	0.02	0.02	0.017	0.017	0.003	0.003	0.003	0.003

kharif and 0.44 to 0.82 g/100 g during summer. Reducing sugars content was significantly decreased with maturity stages increases from M₁ to M₄ during *kharif* (3.68 to 3.36 per cent) and during summer (3.69 to 3.36 per cent). Non-reducing sugars content in *Lagenaria siceraria* fruit was significantly decreased with advancement of maturity stages from M₁ to M₄ as 6.62 to 6.31 per cent and 6.61 to 6.31 during *kharif* and summer, respectively. The chlorophyll content was significantly decreased with the advancement of maturity stages during *kharif* (5.56 to 4.17 mg/ml) and during summer (5.50 to 4.16 mg/ml). The titrable acidity in fruit was decreased with advancement of maturity stages from 0.15 to 0.11 per cent during *kharif* and 0.15 to 0.11 per cent during summer. The carbohydrate content in fresh fruit of *Lagenaria siceraria* decreased in respect of M₁ to M₄ maturity stages from 2.53 to 1.89 g/100 g during *kharif* and 2.52 to 1.87 g/100 g during summer. The T.S.S. content (total soluble solid) was significantly increased for M₁ to M₄ maturity stages from 3.29 to 3.45 °B and 3.30 to 3.47 °B during *kharif* and summer, respectively. The vitamin-C content was increased significantly with advancement of maturity stages varying for M₁ to M₄ during *kharif* (7.72 to 8.24 mg/100 g) and during summer (7.73 to 8.25 mg/100 g). The calcium content in fresh fruit was increased significantly with advancement of maturity stages and accounted in M₁ to M₄ varying from 18.64 to 22.77 mg/100 g during *kharif* and 18.65 to 22.78 mg/100 g during summer. The phosphorus content was significantly decreased from M₁ to M₄ stages of maturity during *kharif*

as 11.68 to 8.67 mg/100 g and during summer as 11.69 to 8.67 mg/100 g.

The chemical compositions of fresh *Lagenaria siceraria* fruits viz., fiber content, calcium content, vitamin-C content and total soluble solids was found to be increased, while moisture content, reducing sugars, non-reducing sugars, chlorophyll content, carbohydrate content and phosphorous content was found to be decreased with advancement of maturity stages (Table-2). The results are therefore supports the earlier work of (7) in cucumber, (8) in *Lagenaria siceraria* c v. Pusa Prolific Long, (9, 10) in *dioscoria* bulbils proximate composition during growing period.

Conclusions

From the present study it is conclude that, the chemical parameters viz. moisture, total soluble solids, reducing sugars, non-reducing sugars, carbohydrate, chlorophyll content, calcium, phosphorus, fiber and vitamin C could be considered as maturity indices to judge the maturity stages of *Lagenaria siceraria* fruits .

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