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EFFECT OF MATURITY STAGES ON PHYSICO-CHEMICAL PARAMETERS OF BOTTLE GOURD (*Lagenaria siceraria* Mol. Standl.) FRUITS Cv. SAMRAT



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Short Profile

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ABSTRACT:

The research work was carried out in order to determine and compare the changes in physicochemical properties of bottle gourd (*Lagenaria siceraria*) fruits at different maturity stages. 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 physical

parameters viz. length of fruit, diameter of fruit, average weight of fruit and yield per plant increased and number of fruits per plant decreased with respect to advancement of maturity stages. The chemical composition of bottle gourd fruit moisture content, reducing sugars, non-reducing sugars, chlorophyll content, carbohydrates and phosphorus content was found to be decreased while fiber content, calcium content, vitamin C and total soluble solids were found to be increased with advancement of maturity stages.

KEYWORDS:

Bottle gourd (*Lagenaria siceraria*), maturity stages, physico-chemical parameters

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 113.92 thousand hectares with 2089.89 thousand tons of production (Anon, 2013).

Besides, *Lagenaria siceraria* has many health be and nutritional benefits. 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 (Rumeza, 2006).

The *Lagenaria siceraria* fruits are rich source of vitamins B, ascorbic acid, pectin, various saponins, fatty oils and fatty alcohols (Badmanaban and Patel, 2009). The manufacturing of value added products of bottle gourd 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 bottle gourd fruits. This ultimately affects quality of processed products prepared from it. But if this fruit harvested late, then it does not remained good for consumption and is thrown as waste. With view to use this over matured bottle gourd fruits along with above mentioned purpose, this research work on processing of bottle gourd was conducted to view the effect of different maturity stages on physico-chemical parameters of bottle gourd fruits.

MATERIAL AND METHODS

The field experiment was carried out during the year *kharif* – 2011 and summer - 2012 at Instruction cum Research Farm, Department of Horticulture, MPKV, Rahuri on 'Samrat' variety of bottle gourd 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 bottle gourd 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 physico-chemical analysis. Ten fruits from each maturity stages were selected randomly for measurement of physical parameters i.e. number of fruits per vine, average fruit weight, length of fruits, diameter of fruits and yield per vine. Chemical parameters moisture and total soluble solids were estimated by the method described by A.O.A.C. (Anon., 1990). However, reducing sugars, non-reducing sugars, titrable acidity, chlorophyll content, calcium, phosphorus, fiber, vitamin C by the Ranganna (2005).

RESULT AND DISCUSSION

Maturity stages of bottle gourd (*Lagenaria siceraria*) fruit had significant influence on physical parameters. The bottle gourd fruits were harvested at different maturity stages i.e. M₁, M₂, M₃ and M₄ during *kharif* and summer seasons to determine the yield and physico-chemical parameters. The bottle gourd fruits were cylindrical in shape in all maturity stages whereas colour was change from dark green to light green with advancement of maturity stages. The physical parameters viz., length of fruits, diameter of fruits, average fruit weight and yield per vine was increased while number of fruits per vine

was decreased with respect of maturity stages during *kharif* and summer seasons (Table 1). This result obtained in present research work are similar to earlier work of Gadhave (2012) in *Lagenaria siceraria*.

Table 1. Effect of different maturity stages on physical parameters of bottle gourd fruits

Treatment	No. of fruits / plant		Average fruit wt (g)		Length of fruit (cm)		Diameter of fruit (cm)		Yield /plant (Kg)	
	<i>Kharif</i>	<i>Summer</i>	<i>Kharif</i>	<i>Summer</i>	<i>Kharif</i>	<i>Summer</i>	<i>Kharif</i>	<i>Summer</i>	<i>Kharif</i>	<i>Summer</i>
M1	13.80	13.00	1069.2	986.4	33.04	32.82	8.30	8.28	12.96	12.55
M2	12.20	11.60	1429.4	1411.6	37.02	36.96	9.52	9.50	17.84	17.14
M3	9.80	9.60	2199.4	2186.0	45.78	45.56	10.20	10.18	20.72	19.91
M4	8.40	8.20	2433.4	2425.0	46.66	46.56	10.44	10.36	21.40	20.58
G. mean	11.05	10.60	1782.8	1752.2	40.63	40.48	9.62	9.58	18.23	17.54
S.E.±	0.38	0.30	15.05	6.15	0.11	0.08	0.05	0.03	0.44	0.17
C.D. at 5 %	1.14	0.90	45.12	18.43	0.34	0.23	0.16	0.10	1.31	0.52

Chemical parameters studied in this research work showed significant difference with respect to maturity stages of fruit. The moisture content in bottle gourdfruits 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 *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 bottle gourdfruit 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 fruit of bottle gourd 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 OB and 3.30 to 3.47 OB 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 bottle gourd 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 Leviset *al.* (1983) in cucumber, Bhatnagar and Sharma (1994) in *Lagenaria*

sicerariacv. Pusa Prolific Long, Libra et al.(2011) in *dioscoria* bulbils proximate composition during growing period.

Table 2.Effect of different maturity stages on chemical parameters of bottle gourd 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 2 contd....

Treatment	TSS (^o 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

CONCLUSION

From the present study it is conclude that, physical parameters viz. number of fruits per plant, average fruit weight, length of fruit, diameter of fruit, yield per plant and chemical parameters viz. total soluble solids, calcium, fiber and vitamin C could be increased with advancement of maturity stages.Hence, the over mature/unmarketable bottle gourd fruits wasused for processing purpose for various value added products preparation.

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