



QUALITY EVALUATION OF ORGANIC BRINJAL

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Abstract

This experiment was carried out with the objective to study and compare the quality characteristics of organic and conventionally cultivated brinjal. 'Haritha' variety of brinjal was selected for the study. Parameters like, physical characteristics, chemical and nutrient composition, anti nutrient profile, shelf life, sensory qualities and pesticide residues were studied. Length and breadth of conventionally cultivated brinjal were significantly greater than organic brinjal. Sensory quality analysis revealed significantly higher values for conventionally cultivated brinjal. They also revealed pesticide residue. However nutrient composition were found to be on par.

Key words:- Organic, pesticide residue, sensory qualities, shelf life, nutrient profile, conventional cultivation.

Introduction

Magkos et al (2006) reported the widespread belief that organic food is significantly safer for consumption than food grown conventionally. This was based mainly on anecdotal evidence and testimonials rather than scientific proof which fuelled increased demand for organic food despite higher prices. Brinjal is a popular and favorite crop grown through out the year in south India. It is highly productive and finds its place as poor man's crop. It plays an important role in nutritious. Systematic studies on quality analysis of organically and conventionally produced common vegetables is lacking in the state of Kerala. Hence a study was taken up to compare the quality of brinjal cultivated organically as well as conventionally.

The objectives of the study are to

1. Compare the physical characteristic of brinjal cultivated using conventional and organic methods
2. Compare their sensory qualities
3. Compare their shelf life
4. Compare their chemical and nutritional qualities
5. Assess their anti-nutritional factors
6. Determine the pesticide residues present in them

Materials and Methods

The experiment entitled 'Quality evaluation of organic brinjal' was conducted to study and compare the quality characteristics of brinjal cultivated using organic and conventional methods.

The methodology is discussed under the following heads

- a. Selection of locale
- b. Selection of vegetables
- c. Selection of treatments
- d. Selection of quality parameters
- e. Statistical analysis

a. Selection of locale

Organic samples for the experiment were collected from the organic bazaar being operated by an NGO, functioning in Thiruvananthapuram city. This is the only organic market prevalent in the whole district. This market is issuing PGS certification (Participating Guarantee Certificate) to farmers who are totally conforming to the organic practices presented by the NGO.

The conventional samples were collected from the local farmers of Kalliyoor Panchayath, nearby the college premises.

b. Selection of vegetables

For better comparison, brinjal of the same variety namely 'Haritha' was selected. Analysis of vegetables was done on the second day after the harvest. Design adapted was CRD with five replications.

c. Selection of treatments

Three types of farming practices were identified as the treatment for the study.

T1 – Organic brinjal – PGS certified – the cultivation area meeting all the requirements prescribed by the NGO.

T2 – Organic input vegetables – (PGS certified – the cultivation area meeting all the requirements presented by the NGO, but the surrounding area not following similar practices.

T1 and T2 treatments emphasized the use of organic manures green manures and organic pest management practices. There was no use of growth regulators and chemical fertilizers

T3 – conventionally grown vegetables (Obtained from the farmers of Kalliyoor panchayath). Their vegetables were grown using chemical fertilizers

- d. Quality parameters selected for the study** – Evaluation of organic brinjal with respect to the following parameters were conducted
- d.1 – Physical qualities
 - d.2 – Sensory qualities
 - d.3 – Shelf life
 - d.4 – Nutrient composition
 - d.5 – Anti nutrient composition
 - d.6 – Pesticide residue

d.1 – Physical qualities

- d.1.1 colour – Colour of fruits was compared by direct observation of five units of samples of each treatments
- d.1.2 appearance – Appearance of fruits of were compared by direct observation of five units of the sample of each treatment and rated on a 5 point hedonic scale. Analysis was done by calculating the ranked mean.
- d.1.3 fresh weight – Brinjal (5 numbers)were weighed on the second day of harvest and average was worked out
- d.1.4 length – Length of brinjal was measured and expressed in centimeters. The average value of 5 units were taken
- d.1.5 breadth – breadth of the brinjal was measured and expressed in centimeters. The average value of 5 units was taken
- d.1.6 Incidence of pests and diseases – The incidence of pests and diseases was taken by direct observation of 5 units of each treatments.

d.2 Sensory qualities - Sensory quality consists of judging the quality of food using our sense organs viz, eyes, nose, mouth and skin.

The sensory qualities were assessed using a score card method proposed by Swaminathan (1995) .The following major quality attributes were included in the score

- d.2.a. appearance
- d.2.b. colour
- d.2.c. flavour
- d.2.d. texture
- d.2.e taste

Each of the above mentioned quality was assessed on a 5 point rating scale ranging from 1 – 5. The evaluation was done by a semi trained panel of 10 members

d.3 Shelf life –

a Physical evidence

Duration with respect to onset of visible marks of deterioration was noted on 5 units of each treatment

b. Physiological loss of water (PLW) – The weight of vegetables were taken daily under ambient conditions and the percentage of loss of water was noted. This procedure was continued to 25 % of the total weight of the stored vegetables were lost.

PLW of vegetables were determined by using the formula – of initial weight – final weight / initial weight x100

d.4 Nutrient composition – The details of nutrient are presented in the table below

Nutrient	Method followed
Moisture	AOAC (1990)
Fibre	Sadasivam & Manikam (1992)
Total minerals	AOAC (1984)
Acidity	Sadasivam & Manikam (1992)
Vitamin C	Srivasthava & Kumar (1998)
Beta Carotene	Jackson (1973)
Calcium	”
Iron	”

d.5. Anti nutrient composition – The specific particulars of anti nutrients analyzed are as given below.

Anti nutrients	Method followed
Oxalate	AOAC (1984)
Phytate	Sadasivam & Manikam (1992)
Phenol	Sharma (2004)
Tannin	Ranganna (2001)

d.6. Pesticide residue was estimated using schimalzu gas chrorratao graph (Anastassiades 2003)

Statistical analysis – Two factor Anova(CRD) was done to elicit information on the relative qualities of organic brinjal with reference to the chemical and physical characteristics studied (Snedor and Cocnran, 1968)

Results and Discussion

The quality evaluation of organic brinjal and conventionally cultivated brinjal was conducted with respect to physical characteristics, sensory qualities, shelf life, nutrient composition, nutrient profile and pesticide residue.

Physical characteristics

Consumer choice is definitely affected by physical appearance of vegetables. Hence a comparative analysis of physical appearance of vegetables from each treatments was done. The characteristics determined of brinjal were colour, appearance, fresh weight, length and breadth

Table 1 represents the physical characteristics of brinjal cultivated under different farming practice. This table shows that length and breadth of brinjal showed significant difference among treatments ($F = 42.12, 26.67$) Conventionally cultivated brinjal revealed higher values for length, breadth and appearance, compared to other treatments. As for appearance organic and inorganic ones (T1 & T3) recorded the same scores. Fresh weight was seen to be higher in organic brinjal. No incidence of pests and diseases were observed in any of the collected samples.

Length and breadth was found to be higher in conventionally cultivated brinjal. This may be due to the application of fertilizers since it increases the size of vegetables. Sheela (1982) and Martin and Prevel (1989) indicates higher pulp weight in inorganic fruits suggesting satisfactory amount of enzymes evolved in starch and protein synthesis under adequate nitrogen and potassium levels.

Sensory evaluation of brinjal

Appearance showed significant difference among the treatments. Appearance was found to be best in organic brinjal (T2) whereas colour, flavour and taste were superior for conventionally cultivated brinjal, but texture was found to be superior in organically cultivated brinjal.

Shelf life

Greater shelf life of vegetables is a need for the farmer to avoid economic loss. Shelf life of the vegetables was determined with respect to 2 parameters namely, duration with respect to oneself visible marks of deterioration and physiological loss of water (PLW).

Shelf life period was determined by noting the number of days the vegetables kept fresh without showing any sign of wilting or disease.

On an average all the treatments of brinjal kept well for 5 days. Conventionally grown brinjal had slightly more shelf life than organic ones. The range of physiological loss of water of brinjal was from 20.57-0 22.86%.

Krishna (2005) found out that shelf life of pods was significantly influenced by the different sources of nutrition and the lower shelf life was observed for conventionally cultivated cowpea. Kampkar (1993) also reported better keeping quality of vegetables in vermi compost applied plots compared to fertilizer application. This indicate that there are other factors besides, cultivation practices that affect shelf life like the water dry matter, interaction, interaction between nutrients and metabolites.

Nutrient composition

Nutrients analysed under the experiment were moisture content, fibre content, total minerals, acidity, Vitamin C, β carotene and minerals like calcium and iron. The results are presented in the table. 4

Moisture, fibre, minerals, acidity, calcium and iron levels were on par. Vitamin C levels and β carotene levels were significantly higher in organic brinjal. Review of literature in general, reveals that organic produce have higher nutritive value, though the biological mechanisms responsible for this have not been explained in most of the contents. However, Lundegardh (2003) has concluded on the observation of better nutritional value of organic produce owing to greater activation of plant defense mechanism (without pesticide) with active soil life of interacting plants and microbes, balanced mineral in take without excess of nutrients from fertilizer.

Anti-nutrients

Availability of nutrients is affected by the presence of anti-nutrients. Oxalates, phytates, phenols and tannins were the anti-nutrients analysed under the experiment. The results are depicted in the table 5. The results did not show much difference among the treatments.

Pesticide Residue

Results of pesticide residue analysis showed that T3 of brinjal contained a pesticide named malathion at 0.08 ppm concentration. The maximum residue limit of this particular pesticide is 0.05 ppm.

Bourn et al (2002) found after an extensive survey on vegetables that 17 – 50 percent of conventional vegetables contained pesticide residues. In a similar study by Tasiopoulon et al (2007) concluded that 97.4% of organic farming products were devoid of detectable pesticide residues.

This study concludes that organic cultivation does not affect the sensory qualities of produce with respect to appearance, colour, flavour, texture and taste, thus endearing it more among consumers. Nutrient wise, β carotene and vitamin C were seen to be significantly higher in organic treatments. Many of the physical and chemical features were on par amongst the treatments. However, in this era, where food safety is the prime concern of the universe at large, a pesticide free produce is a blessing for the health of man kind.

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Annexure

Tables

Table 1 – Physical characteristics of brinjal

Treatments	Colour (ranked mean)	Appearance (ranked mean)	Fresh Weight (g)	Length (cm)	Breadth (cm)
T1	6.50	9.10	41.18	14.78	8.16
T2	7.50	5.80	39.34	17.96	8.30
T3	10.0	9.10	39.26	19.40	11.08
Mean	8.0	8.0	39.59	17.38	9.18
F value	1.83 NS	2.23NS		42.12**	26.67**

Table 2 – Sensory qualities of brinjal

Attributes	Scores of different treatments			
	T1	T2	T3	X2
Appearance	9.0	9.45	8.05	8.82**
Colour	14.3	14.50	17.70	1.03
Flavour	13.0	12.25	17.25	2.16
Texture	17.15	17.05	12.30	2.17
Taste	14.95	11.25	20.3	5.62

CV at 5% 5.991

CV at 1% 13.815

Table – 3

Shelf life parameters of Brinjal

Parameters	Treatments		
	T1	T2	T3
No of days vegetables kept well without physical deterioration	5	5	5
PLW	22.86	20.57	21.2

Table 4 Nutrient Analysis of brinjal**Treatments**

	T1	T2	T3	CD (0.05)
Moisture (%)	90.77	88.60	90.71	1.11
Fibre (%)	0.72	0.76	0.84	0.23
Total mineral (%)	0.66	0.66	0.70	0.12
Acidity (%)	1.22	1.22	1.26	0.08
Vitamin C (mg)	15.64	15.68	10.46	0.18
β carotene (mg)	289	259	235	5.33
Calcium (mg)	18.6	20	18.6	1.15
Iron (mg)	0.3	0.32	0.24	0.14

Table 5 Anti-nutrient profile of brinjal

Anti-nutrient	T1	T2	T3	CD (0.05)
Oxalate (%)	0.79	0.94	0.69	0.02
Phytate (%)	0.28	0.29	0.26	
Phenol (mg)	58.1	60.38	60.82	
Tannin (ing)	15.2	14.46	15.12	