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RESEARCH ARTICLE

QUALITY ANALYSIS OF ORGANIC RIPE RASAKADALI

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ABSTRACT

The study was carried out with the objective to study and compare the quality characteristics of “rasakadali” variety of banana, cultivated by conventional and organic farming techniques. Physical characteristics, sensory qualities of fruit, shelf life, nutrient/chemical composition, anti nutrient and pesticide residue were the parameters investigated in the present study. Among the physical qualities, mean fruit weight revealed significantly higher values for organically cultivated “rasakadali”. Sensory qualities were evaluated to be better for organic products, with significantly higher values for appearance and taste. Sensory qualities and chemical properties showed uniform trends in storage among both treatments. Moisture content, total minerals and vitamin C content were seen to be higher in organically cultivated “rasakadali”. Potassium, calcium and iron were significantly higher in organic “rasakadali”. With respect to anti nutrients, tannins were significantly higher in organic “rasakadali”. Pesticide residue was not detected in any of the samples.

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INTRODUCTION

There is widespread public belief, promoted by the organic food industry, that organic food is safer, more nutritious, and tastes better than conventional food. These beliefs have fueled increased demand for organic food despite higher prices and difficulty in confirming these claimed benefits scientifically. (Canavari *et al.*, 2009) Rasakadali is an important and exotic cultivated variety of banana, grown for fruit purpose. The plants are medium sized and slender, yellowish skin, pseudo stem having reddish petiole. The fruits are small, highly fragrant, tasty, powdery and firm. An average bunch weighs about 12kg. It is also known as, 'neypoovan', 'njaliipoovan', 'vadakkan kadali', 'safed velchi, Elakkabele' (Rao, 1998)

The objectives of this study was to

- Compare the physical characteristics, sensory qualities and shelf life of rasakadali variety banana cultivated using conventional and organic methods
- Assess the chemical and nutritional qualities
- Determine the anti nutritional factors and pesticide residue present

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MATERIALS AND METHODS

The methodology is discussed under the following heads

- Selection of fruits
- Selection of treatments
- Selection of quality parameters
- Statistical analysis

Selection of fruits

Organic samples of “rasakadali” were collected from the Organic farm, College of agriculture, Vellayani and Conventionally cultivated varieties were collected from the instructional farm, College of agriculture, Vellayani.

To reduce variations and obtain consistent data, measurements were limited to the fingers of the second hand of the freshly harvested physiologically matured bunches. The selected bananas were very clean, (free from defects such as scars, physical damage, insect injury and latex staining). The fruits were free from decay, had an adequate finger length and diameter and did not have an excess curvature upon ripening. They had the desired uniform yellow colour and aroma. Fruits which were in the fifth colour stage (matching with the banana colour chart of SH Pratt and company, 2012) was selected.

Selection of treatments

Two types of farming practices were identified as the treatments for the study.

T1- Organic farming

Fertilizers applied in organic plots were as recorded below

- FYM or compost or green leaves @ 10kg/ plant
- 500g of lime, vermin compost @ 2kg/ pit.
- Ground nut cake/ neem cake @ of 1kg/ pit
- N,P and K bio – fertilizer mixed with FYM and PGPR mix I @ 50 – 100g/ pit

These fertilizers were applied at the time of planting. Panchagavya 3% as foliar spray was also applied three times at the 3rd, 6th and 9th months after planting.

T2- Conventional farming

Fertilizers applied in Conventionally cultivated banana plots were

Compost, cattle manure or green leaves @ 10kg/ plant at the time of planting and N: P₂O₅: K₂O were applied at the rate of 100: 200: 400

Quality parameters selected for the study were

- Physical characteristics
- Sensory qualities of fruits
- Shelf life
- Nutrient / Chemical composition
- Anti nutrients
- Pesticide residue

Three samples of rasakadali were taken for measuring the quality parameters.

Physical characteristics

Appearance

Ripeness was assessed by comparing the colour of the peel with standardized colour chart that describe various stages of ripeness (SH Pratt and company,2012)

Total number of hands per bunch

Total number of hands were obtained by counting the number of hands per bunch (Soltani, 2011).

Total number of fruits/hand

Total number of fruits/ hand were obtained by counting the number of fruits/each hand in each sample (Soltani, 2011).

Mean fruit weight

Fruit weight changes during maturation. Fruit weight is reported to increase when bunch age increases. The formula

used for finding mean fruit weight was $\text{Mean fruit weight} = \frac{\text{wt of bunch} - \text{wt of stalk}}{\text{total number of fingers}}$ (Soltani, 2011).

Peel thickness

Each fruit from the samples were hand peeled after cutting transversely at the mid point, and thickness was measured with vernier calipers (Dadzie, 1994)

Pulp to peel ratio

Pulp and peel were separated, weighed individually and expressed as 'peel to pulp ratio' (i.e., pulp weight divided by peel weight) (Brady, 1987)

Sensory qualities of food

Sensory evaluation is defined as a scientific discipline to evoke, measure, analyze and interpret results of those characteristics of foods, as they are perceived by the senses of smell, taste, touch and hearing. The primary consideration for selecting and eating a food commodity subjectively, is after assessing the sensory qualities of fruit for its appearance, colour, flavour, taste and texture. Score card was used to evaluate these parameters in the sensory evaluation by judges.

Peeling condition

Ease of peeling depends on the peel thickness and degree of adhesiveness of the peel to pulp. Score card was used as an index for assessing peeling condition (INIDAP, 2001).

Shelf life

Shelf life study on the samples were done by assessing organoleptic properties on alternative days until spoilage. The moisture, acidity and TSS levels of the fruits were also analysed during alternate days of storage.

Nutrient /chemical composition

The various nutrients/chemicals were analysed using standard procedures, as listed below-

Moisture content-A.O.A.C (1990).
Acidity-A.O.A.C(1984).
Vitamin C-Sadasivam and Manikam (1992).
Total Soluble Solids-Refractometer (0-20 brix).
Total minerals-Raghuramalu *et al.* (1983)
Potassium- Jackson (1973).
Sodium-Jackson (1973).
Calcium-Jackson, 1973
Iron-Jackson (1973)

Anti nutrients

Standard procedures were adopted to analyse phenols and tannins

Phenol- Sharma (2001)
Tannin-Ranganna (2001).

Pesticide Residue

The samples were analysed using Schimatzu gas chromatograph (Anastassiades, 2003).

Statistical Analysis

Homogeneity of variances in the two treatments were tested using F – test. It was observed that there was similarity in variances Students t –test at 5% and 1% level of significance was adopted to compare significant differences in various parameters of the two treatments T1 and T2.

RESULTS

Physical characteristics

The characteristics determined for “rasakadali” banana were appearance, total no of hands per bunch, no of fruits per hand, mean fruit weight, peel thickness and pulp to peel ratio. Table 1 represents the physical characteristics of rasakadali cultivated under organic and conventional farming techniques.

Since the colour chart was used to select the varieties uniformly, the peel colour of all the varieties was rated against the colour chart as stage 6.

Table 1. Physical characteristics of” rasakadali” banana

S.No	Physical characteristics	T1	T2	TSE
1	Total no of hands/bunch	10.00	10.00	0
2	Total no of fruits/hand	17	16	1.00
3	Mean fruit weight	124.56	121.56	3.25*
4	Peel thickness	0.36	0.3	2.0
5	Pulp to peel ratio	2.04	4.84	1.7
6.	Peeling condition	5	5	5

$t=2.776$ at 5% level $t=4.609$ at 1% level

Mean fruit weight was found to be significantly higher in organic “rasakadali, “other characteristics were found to be on par.

Sensory qualities of “rasakadali”

Table 2 represents the sensory qualities of “rasakadali” cultivated under organic and conventional farming techniques

Table 2. Sensory qualities of “rasakadali” banana

S.No	Sensory characteristics	T1	T2	TSE
1	Appearance	3.9	3.3	3.25**
2	Colour	4.4	3.9	2.06
3	Flavour	3.7	3.5	0.88
4	Texture	3.6	3.7	0.49
5	Taste	5.0	4.3	4.7**

$t=2.10$ at 5% level of significance

$t=2.87$ at 1% level of significance

All sensory parameters were rated high for organically cultivated “rasakadali” and the difference was significantly higher for appearance and taste

Shelf life

Changes in sensory qualities and chemical constituents during 7 days did not show significant difference among treatments

Chemical/nutrient composition

Nutrients analysed under the experiments were acidity, vitamin C, TSS, total minerals and minerals like K, Na, Ca and Fe. The results are presented in Table 3.

Table 3. Nutrient composition of rasakadali banana

S.No	Nutrients	T1	T2	TSE
1.	Moisture(%)	80.7	75.1	21.7**
2.	Acidity(%)	1.13	1.27	3.02*
3.	TSS(%)	17.1	17	0.90
4.	Vitamin C(mg)	6.46	4.86	16.97**
5.	Total minerals(mg)	0.74	0.59	5.74**
6.	Calcium(mg)	12.62	11.99	8.55**
7.	Iron(mg)	0.28	0.27	2.27*
8.	K(mg)	79.4	78.4	4.06**
9.	Na(mg)	27.91	27.02	1.15

$t=2.776$ at 5% level $t=4.609$ at 1% level

Acidity of conventionally cultivated bananas were significantly higher. While moisture, vitamin C, total minerals, Calcium, iron and potassium were significantly higher for organic samples

Anti nutrient profile

When phenol content was found to be on par, tannin content was found to be significantly higher for organic rasakadali as compared to conventionally cultivated rasakadali (3.9 mg and 0.328 mg respectively)

Pesticide residue

The pesticides tested were organochlorides, organophosphates and synthetic pyrethroids. The results revealed that there was no pesticide residue in ‘rasakadali ‘ in both the treatments

Conclusion

This study concludes that organically cultivated bananas were on par with conventionally cultivated varieties with respect to physical characteristics. Infact fruit weight was significantly higher for organic samples. Organically cultivated samples were seen to have acceptability with respect to all parameters, but significantly higher for appearance and taste. Nutrient wise, total minerals, vitamin C, Calcium, iron and potassium were seen to be higher in organically cultivated samples. They are preferred from the health point of view too.

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