



A Comparative Quality analysis of Banana (var palayamkodan)

Sreedevi L. and Divakar Suma

Department of Home Science, College of Agriculture, Vellayani, Thiruvananthapuram, INDIA

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Abstract

The project entitled “Quality evaluation of organic ripe banana” was carried out with the objective to study and compare the quality characteristics of palayankodan variety cultivated by conventional and organic farming techniques. Physical characteristics, sensory qualities of fruit, shelf life, nutrient/chemical composition, anti nutrients and pesticide residue were the parameters investigated in the present study. With respect to physical characteristics- appearance, total number of hands/bunch and number of fruits per hand were on par among the treatments Pulp to peel ratio was higher in conventionally cultivated palayankodan variety and this difference was statistically significant. As far as sensory qualities were concerned organic treatment depicted higher significant values for colour, texture and taste. Storage studies revealed uniform trends in the increase and decrease in ratings, among both treatments, throughout the period of storage. Moisture content of organic produce were significantly higher. Total minerals, calcium, and sodium were significantly higher in organically cultivated varieties. However pesticide residue analysis showed nil results. Hence it can be concluded that organic samples scored higher in sensory qualities (colour, texture and taste) and nutritional qualities (moisture and minerals) With respect to physical characteristics the values were on par in both the samples. Shelf life studies revealed similar trends in both organic and conventional produce.

Keywords: Organic cultivation, conventional cultivation, physical characteristics, sensory qualities, shelf life.

Introduction

There has been a major shift towards organic products, especially fruits and vegetables in the metropolitan cities. Organic food is invariably catching up fast with the Indian retailers more so with the niche retailers for the simple reason that there is an awakening in Indian consumers to eat healthy and to the natural bent towards food which does not include foreign material which tend to be toxic.

Palayankodan is one of the leading south Indian cultivars, which is accepted because of its better yield, and adaptability to rain fed cultivation and different levels of sunlight, along with being resistant to diseases.

In the interest of the ‘organically and health conscious consumerism’, a systematic and comprehensive study into the quality analysis of organic banana and conventionally cultivated banana, with respect to its physical, sensory, nutritional and shelf life is attempted, as it was lacking in this part of the country. This study was carried out to get an overall scientific comparison of the common man’s fruit-the banana (*palayankodan*) cultivated by conventional and organic practices

Material and Methods

The methodology is discussed under the following heads: selection of locale, selection of fruits, selection of treatments,

selection of quality parameters, statistical analysis, selection of locale.

Organic samples of *palayankodan* variety of bananas were collected from the organic farm, college of agriculture; Vellayani and conventionally cultivated *palayankodan* were collected from the instructional farm, college of agriculture, Vellayani.

Selection of fruits: *Palayankodan* (AAB)- *Palayankodan* is one of the leading south Indian cultivars, which is accepted because of its better yield, and adaptability to rain fed cultivation and different levels of sunlight, along with being resistant to diseases. Hence a comparison of this popular table fruit was resorted to.

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). 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)¹ were selected.

Selection of treatments: Two types of farming practices were identified as the treatments for the study-T1 and T2. 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 in the ratio-100: 200: 400.

Quality parameters selected for the study were: Physical characteristics: Appearance, total number of hands per bunch, total number of fruits/hand, mean fruit weight, peel thickness and pulp to peel ratio were the parameters that were compared

Sensory qualities of fruits: Trained judges (10 nos) were selected for sensory evaluation, for evaluating appearance, colour, flavour, texture, taste and peeling condition of the bananas

Shelf life: Shelf life study on banana varieties 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 major nutrients /chemicals analysed in this experiments were Moisture (AOAC1990)², acidity (AOAC1984)³, vitamin C⁴ TSS, total minerals⁵, potassium, sodium, calcium and iron using standard methods⁶.

Anti nutrients: Phenol: phenol content was determined by the procedure suggested by Sharma⁷ and Tannin was estimated as per the procedure outlined by Ranganna⁸.

Pesticide residue: Pesticide residue was estimated using Schimatzu gas chromatograph⁹.

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. Three samples of each treatment were taken for measuring the quality parameters.

Results and Discussion

Physical characteristics: Appearance: Since, the colour chart, was used to select the varieties uniformly, the peel colour of all the varieties were rated against the colour chart as stage 5, i.e., the stage when the peel colour was completely transformed to yellow from the pale green stage. This stage was purposefully selected, so as to ensure uniformity in all the other characteristics, for the favour of qualitative comparison.

Other physical characteristics: The pulp to peel ratio was higher in the conventional samples the difference in these values among treatments were significant at 1 percent level of significance. All other parameters were on par.

Table-1
Physical characteristics of the banana samples

Parameters	T1	T2	TSE
Mean fruit weight (g)	131.95	129.91	1.709
Total number of hands/bunch	10.33	9.66	1.41
Total number of fruits/ hand	19.33	19	1.00
Peel thickness(cm)	0.5	0.5	0.00
Pulp to peel ratio	2.02	4.17	6.43**

t=2.776, at 5 % significance and t=4.604, at 1% significance

Sensory qualities: The organic samples scored significantly higher values for colour, texture and taste than their inorganic counterparts the difference in scores was significant at 1 percent level of significance. Organic fertilizers are seen to increase TSS of fruits which could be affecting the firmness and appearance of fruits¹⁰. Sams¹¹ had rightly concluded that fruit texture is influenced by environmental, cultural, physiological and genetic factors organically cultivated bananas had significantly higher values for taste as compared to conventionally cultivated bananas.

Table-2
Sensory qualities of the bananas

Sensory Parameters	T1	T2	TSE
Appearance	4.3	3.8	1.98
Colour	3.5	4.1	3.08**
Flavour	3.8	3.6	0.94
Texture	3.9	3.3	3.28**
Taste	4.6	3.6	4**

t=2.10, at 5 % significance and t=2.87, at 1% significance

Shelf life: In this study, Organic and conventional production system did not create major sensory differences during storage in foods as depicted in following graphs.

Moisture levels were increasing more or less uniformly during the storage period in both types of treatments. With regard to acidity, Palayankodan showed significant differences among treatments on third and fifth days.(figure-8). TSS values increased with storage in all treatments. Organically treated samples maintained higher TSS all throughout. The values were significantly different on the 5th and 7th days.

Moisture content was seen to be higher in organically cultivated bananas and they were seen to be significantly affected by cultivation practices. The acidity content of inorganic palayankodan were higher. This could be because most of the chemical fertilizers have high acid content¹².

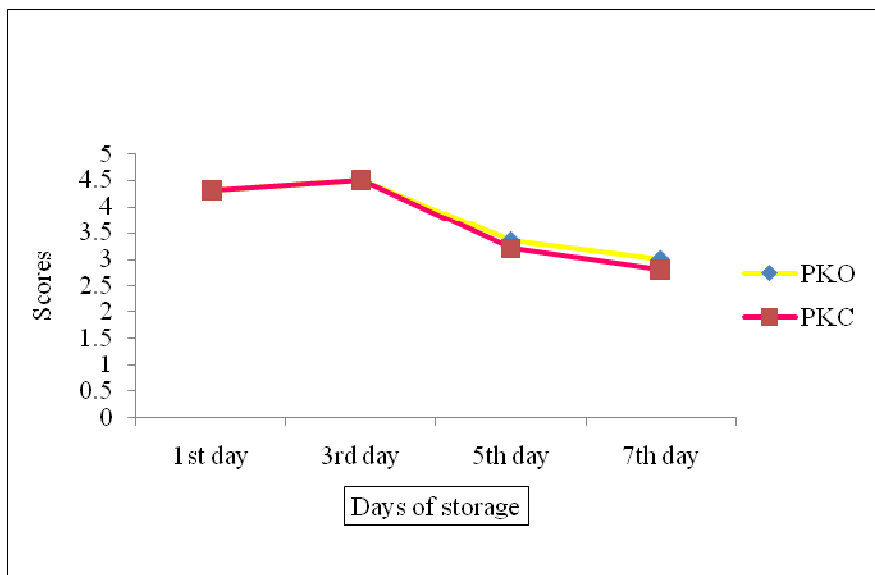


Figure-1
Appearance of palayankodan during storage

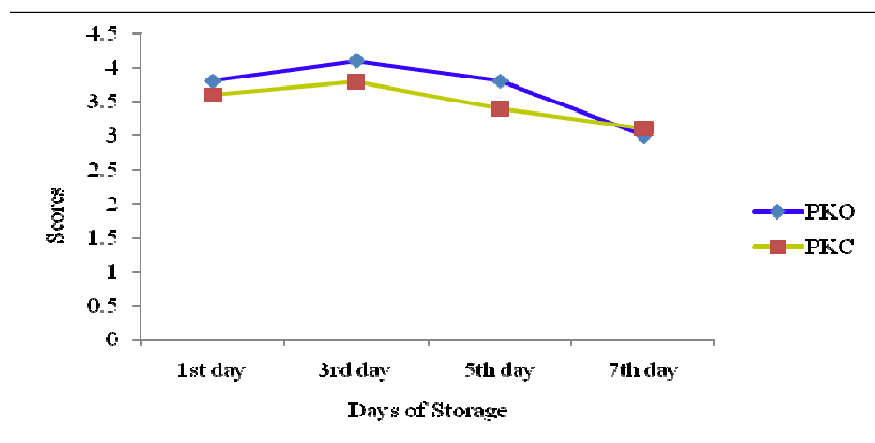


Figure-2
Change in the flavour of palayankodan variety during storage

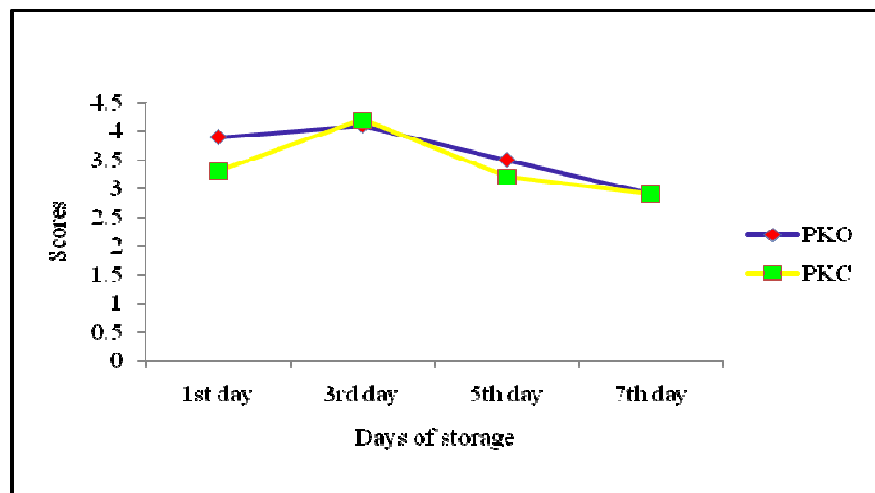


Figure-3
Change in the Texture of palayankodan variety during storage

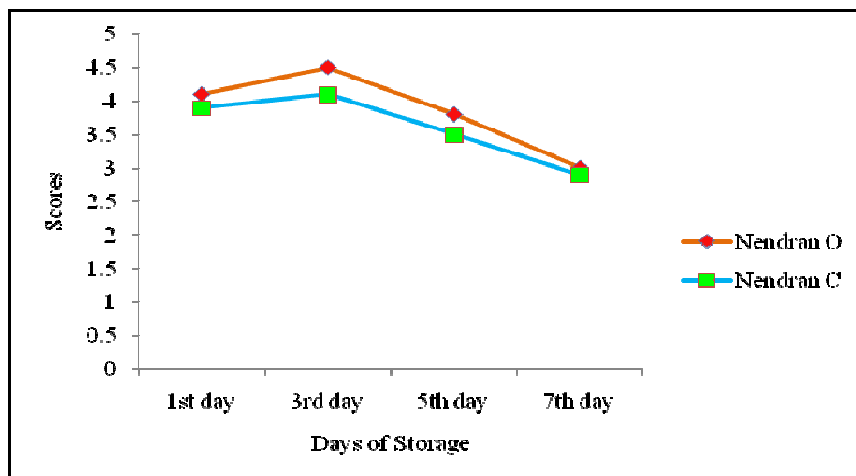


Figure-4
Change in the Taste of Nendran variety during storage

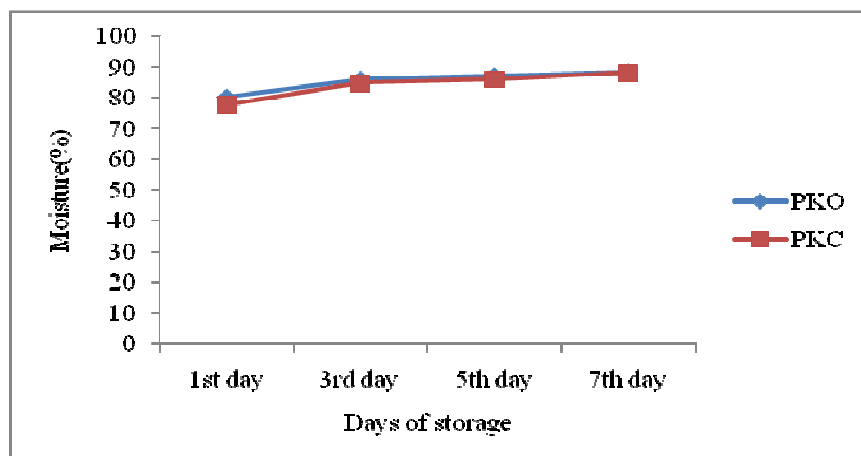


Figure-5
Moisture of Palayankodan during Storage

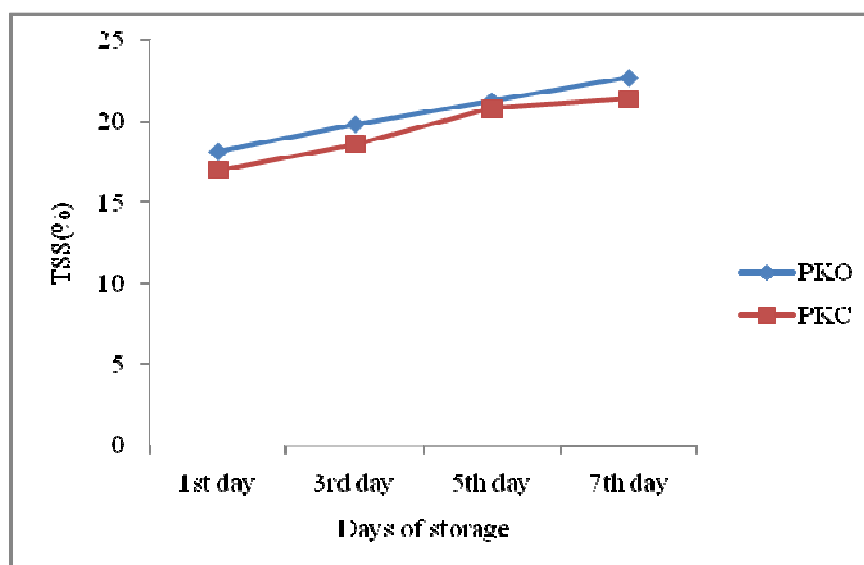


Figure-6
TSS of Palayankodan during storage

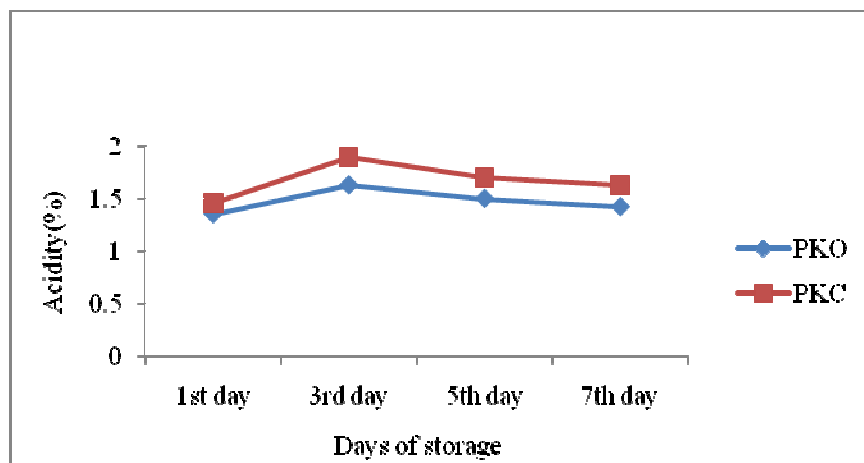


Figure-7
 Acidity of palayankodan during storage

Table-3
 Chemical/nutrient composition

Parameters	T1	T2	TSE
Moisture	80.4	77.8	13.2**
TSS	18.73	17	1.7
Acidity	1.35	1.46	0.8
Total minerals	0.72	0.51	7.59**
Potassium	80.76	79.76	2
Sodium	28.68	27.55	2.94*
Calcium	13.33	12.50	2.41*
Iron	0.28	0.27	0.45
Phenol	4.6	4.6	1
Tannin	4.3	3.8	1.98

t=2.776, at 5 % significance and t=4.604, at 1% significance

Total Soluble Solids were seen to be higher in organically cultivated palayankodan, and the values were found to be significantly different in the case of nendran at 1 % level. Total Soluble Solids increases on ripening. This increased total soluble solid is due to the increased movement of water into the flesh and the degradation of starch to soluble sugar within the cell (Palmer, 1984)¹³ and Fadni¹⁴ had indicated that, organic manure decreased soil pH values and increased the nutrient uptake by plants.

Organically cultivated palayankodan was seen to be high in potassium content than the conventionally cultivated samples. This fact was also reported by Hang *et al*¹⁵ who found that organic fertilizer application increased phosphorous and potassium in soil and makes it more available.

Sodium and calcium content were significantly higher in organic samples of banana than inorganic samples. Akoe *et al*.¹⁶ observed that, general intake of all nutrients were improved with organic manure application – probably due to slow and effective release of nutrients in comparison to chemical fertilizers. Phenol and tannin content were found to be on par among the

treatments.

Pesticide residue: Pesticide residue refers to the pesticides that may remain on or in food after they are applied to food crops¹⁷. The results of gas chromatography, revealed that pesticide content in each banana sample were not detectable

Conclusion

The qualitative comparison on the whole, depicts a better nutrient and sensory profile of organic palayankodan. The physical characteristics, shelf life and safety aspects were found to be on par among the treatments

Acknowledgement

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