

Pre- Investigation on the Effect of Using Natural products on Organic Banana Handling

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Abstract

Organic banana fruits were harvested from an orchard at Sennar, Sudan, and the fruits were subjected to six different treatments and stored in a cold room at 14°C in order to prolong the shelf life before ripening. Treatment No.1 which was washing in running water +post-harvest treatment including application of 20g Alaun+ 1.2ml citrex, crown application, was found to be the best treatment for the retardation of ripening for 15 days. The experiment was designed to resemble a loaded truck from Sennar up to Germany where banana were to be ripened and marketed.

Key words: Organic Banana fruit; s; quality; shelf-life.

Introduction

Growth of organic production has been sustained by developing high levels of knowledge of organic production measures and awareness of market requirements among producers. The future market potential is considered promising, especially for newly developing European markets. Direct trading links established for organic products between producers and commercial organizations have been seen to bring increased benefits to the producers. Ripening fruit undergoes many physicochemical changes after harvest determine the quality of the fruit purchased by the consumer. It is a schematic event in the life of a fruit as it transforms a physiological mature but inedible plant organ into a visually attractive olfactory and taste sensation. Ripening marks the completion of development of a fruit and the commencement of senescence and it is normally on irreversible event (Willis *et al.*, 1998).Banana crown browning can be greatly reduced by de-handing the bunches in water basins and dipping them in solutions 0.1 % thiourea or aluminum potassium sulfate, and then transported or stored at 14C⁰ (Esmail *et,al* 2001). The main banana cultivar which is grown in Sudan

is namely ('Dwarf Cavendish') and lately other varieties were introduced mainly ('Grand Nain' and 'Williams') which are both suitable for export. Due to the nature of producing areas which lies mainly at the banks of the Blue Nile which is known for its high fertility, attention was diverted to the production of organic bananas and its potentiality for export. This experiment was designed according to the requirements and directions of whole sellers at the other end in Germany. Fruits were treated and transported by trucks via Jeddah and Turkey up to Germany. The main objectives of the experiment were to find the best trial for the retardation of ripening up to two weeks which is the distance from production areas up to Germany. To resemble this journey experiment was designed to study the export of organic bananas from production area up to the other end at Germany. Storage of Bananas was intended to retard ripening by application of different treatments and storage at the Nation Food Research Center, Khartoum North for the determination of the longest period for ripening retardation at the best treatment applied for future adoption.

The aim of this experiment was to prolong the shelf- life of green organic bananas by Using Natural products and storage in a cold room at 14°C.

Materials and Methods

Banana fruits were harvested from an orchard at Singa locality, Sennar State, Sudan. As soon as the flower appeared banana bunches were covered by plastic bags for extra protection. In order to give the largest bunch weight only one bunch/ plant was left. The small bananas in the bottom rows were cut off. A "snake" which is a protection pad placed between the banana rows was used at harvest and one of the workers stroked the banana trunk to let the bunch falls slowly on the shoulder pad of the second worker. Bananas were transported to the packing station as careful as possible. After the removed of the flower tips, the hands were cut with crown as large as possible. The hands were submerged into the washing basin in such a way that the crown is completely under water. Care was taken that the hands should not affect each other. After 5 minutes in water the hands were cut into clusters of 4-8 fingers and were laid into the second basin. Bananas were placed for 5 minutes in the second basin. They were then taken out of the water and were left to only for 10 minutes.

After drying post harvest trails were applied as follows to control crown rot disease and prolong fruit shelf life before ripening:

Trial 1 was consisted of washing water with no treatments and then water contained 20 g alum and 1.2 ml citrex per liter of water. Trail 2 was consisted of washing water with no treatments and then water contained 40 g alum and 2 ml citrex per liter of water. Trial 3 was consisted of washing water contained 0.5 g alum per liter and then water contained 20 g alum and 1.2 ml citrex per liter of water, Trial 4 was consisted of washing water contained 1 liter lemon juice and 0.5 kg alum and then water contained 20 g alum and 1.5 ml citrex per liter of water. Trial 5 was consisted of washing water contained 1 liter of lemon juice, 0.5 kg alum and 3 ppm chlorine and the water contained 20 g alum and 1.5 ml citrex per liter of water. Trial 6 was consisted of washing water contained 0.5 kg alum and 3 ppm chlorine and then water contained 20 g alum and 1.5 ml citrex per liter of water. Tap water was used for washing and for the application of treatments. After the treatments crowns were sprayed twice at the sides of the cuts. Bananas were carefully packed in four rows into a carton boxes. Bananas were packed homogeneously to the correct weight and then the fruits were covered by polyethylene films. Fruits were handled as carefully as possible in order to control bruises. Fruits were kept at 15°C for 14 days at Nation Food Research Center cold stores. The following parameters were treated using appropriate methods:

1. **Crown rot %:** Crown rot was visually observed by a qualified scientist and the number of affected fingers was conducted and taken as a percentage from the total number of stored fingers in a carton box.
2. **Peel rot %:** Peel rot was visually observed and the number of affected fingers was counted and taken as a percentage from the total number of stored fingers in a carton box.
3. **End rot %:** End rot was visually observed and the number of affected fingers was counted and taken as a percentage from the total number of stored fingers in a carton box.
4. **Peel residue %:** Peel residue was visually observed, the residue was in the form of whitish color on some parts of the fingers. The number of fingers was

counted and taken as a percentage from the total number of stored fingers in a carton box.

5. Peel color: Peel color was determined after 15 days of storage using Banana color chart developed by Chiquita United Brands Company (Chiquita Brand Inc, 1975). The Chart was used for the estimation of color scores as follows:

- Color index No. 1, green color.
- Color index No. 2, green color with trace of yellow.
- Color index No. 3, more green color than yellow > 50%.
- Color index No. 4, more yellow than green > 50%.
- Color index No. 5, yellow with green tips.
- Color index No. 6, complete yellow color.
- Color index No. 7 complete yellow flecked with brown.

6. Flesh firmness: Flesh firmness was determined using Magness and Taylor firmness Tester (D. Balluf Meg. Co.) equipped with an 8mm- diameter plunger tip. Fruits were tested for firmness as unpeeled and peeled.

7. Total Soluble Solids (TSS): Total Soluble Solids (TSS) was measured after 14 days of storage using kruss hand refractometer (Model HRN- 32). Two readings were taken from each fruit and mean values were calculated and corrected according to the refractometer chart.

8. Titrable acidity: was determined according to the method described by Pearson (1973).

9. Total soluble solids, acidity ratio.

10. Statistical Analysis:

Analysis of variance (ANOVA), followed by fisher's protected LSD test with a significance level of $P \leq 0.05$ were performed on the data (Gomez and Gomez, 1984).

Results and Discussion

Table 1 showed the effect of 6 different post- harvest treatments at day 1 on the crown rot, end rot, peel rot, firmness of peeled and unpeeled banana, fruit color, total soluble solids, acidity and total soluble solids, acidity ratio. No rotten was observed among

treated fruits and the fruits were firm and green with low concentration of total soluble solids and stable acidity.

Table 2 showed the effect of 6 different post- harvest treatments at day 15 on the crown rot, end rot, peel rot, firmness of peeled and unpeeled banana, fruit color, total soluble solids, acidity and total soluble solids, acidity ratio. Banana fruits treated with the application of 20g Alaun and 1.2ml Citrex, crown application showed the best results out of the other 5 treatments (Table 2). Crown rot was only 0.4%, end rot 18%, peel rot 1.4% as far as microbiological analysis is concerned. Whereas at the same time fruits were very firm either peeled or unpeeled and showed the following results respectively, 10 and 8.6. The color of the fruits was green and scored 1.3 which is almost comparable to fruit color on day 1 which was 1.0. Although the end rots were high (18%) it was 60% less than the end rot of the other 5 treatments (Table 2). Fruits affected with end rots were considered as a minor disorder and bananas were quite safe able and are not affected as quality as considered. Usage of polyethylene film increased the incidence of moisture and this was reflected upon microbial disorders. It is therefore recommended to use polyethylene film with small openings or vacuumed packing.

Conclusion and Recommendation

After storage at 15°C for two weeks, the best physiological trial was found to be trial No. 1 which was, washing in running water and post- harvest treatment including application of 20g alum and 1.2 Citrex Crown application and was hence highly recommended to be practiced on organic bananas intended for export from production areas at Sennar, Sudan up to the other end at Germany.

Table 1: The effect of six different post- harvest trials on different physiological characters of organic bananas at day 1.

Treatment	Crown rot	End rot	Peel rot	Firmness unpeeled	Firmness peeled	Fruit color	TSS	Acidity	Ratio
1	0	0	0	> 10	10	1	4.4	6	0.7:1
2	0	0	0	> 10	10	1	5.3	6	0.8:1
3	0	0	0	> 10	10	1	5.8	6	.9:1
4	0	0	0	> 10	10	1	5.6	6	0.9:1
5	0	0	0	> 10	10	1	5.2	6	0.8:1
6	0	0	0	> 10	10	1	5.2	6	0.8:1

Table 2: The effect of six different post- harvest trials on different physiological characters of organic bananas after 14 days of storage at 15°C 76-78 RH.

Treatment	Crown rot	End rot	Peel rot	Firmness unpeeled	Firmness peeled	Fruit color	TSS	Acidity
1	0.4	18.0	1.40	10.00	8.60	1.30	12.46	5.400
2	1.4	27.2	3.40	10.00	8.10	1.40	11.70	5.000
3	7.0	20.8	2.80	9.00	6.30	1.70	13.40	5.000
4	20.0	36.2	15.40	7.40	4.60	3.20	15.20	5.000
5	19.0	27.8	6.80	6.00	1.40	4.40	16.40	5.000
6	10.0	38.4	1.40	9.00	2.00	3.60	14.00	5.000
Mean	9.6	28.1	5.20	8.57	5.17	2.60	13.86	5.067
Sig. L	**	**	**	**	**	**	**	**
S. E±	3.77	4.10	1.380	0.823	1.166	0.588	1.014	0.1000

LSD (0.05)	11.0	11.96	4.027	2.401	3.403	1.716	2.959	0.2919
C. V. (%)	87.5	32.6	59.3	21.5	50.5	50.6	16.4	4.4

** Significant at 0.01 probability level

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