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Original Research Article

Effect of Post Harvest Treatments on Physicochemical Composition of Banana (*Musa paradisica* L.) cv. Grand Naine

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A B S T R A C T

Present investigation entitled "Studies on extension of shelf life of banana (*Musa paradisica* L.)" (Cv. 'Grand Naine') fruits were harvested at physiological stage of maturity. Fruits were graded, washed and dried under fan. After that fruits were treated with 1-Methylcyclopropene (1-MCP) at three concentrations 5ppm, 10ppm and 15ppm for 6 hr. duration, Putrescine (1mM), Spermidine (0.5mM) and Wax (6%). Effect of different chemicals significantly affected on Titratable acidity, Total soluble solids, Ascorbic acid content, Reducing sugar, Non Reducing sugar, and Total sugars, the Maximum titratable acidity found in treatment T_7 (0.54), Maximum Total soluble solids found in treatment T_{10} (19.6), The maximum Ascorbic acid content found in treatment T_7 (11.28), The maximum Reducing sugar found in treatment T_7 (13.20), The maximum Non reducing sugar found in treatment T_7 (8.62), The maximum Total sugars found in treatment T_7 (21.82).

Keywords

1-MCP, Putrescine, Spermidine, Wax, Banana, Grand Naine

Introduction

Banana (*Musa paradisica* L.) is one of the most important fruit crop in India and it is one of the major staple fruit of tropical and sub-tropical regions of the world. It is a plant that all of the plant part including leaves; pseudo stem can be used in one way or another. Bananas are usually harvested green at about 75% maturity, transported to distance markets and are ripened afterwards. During transit, they should remain green and firm for one to two weeks, depending on market distance. The green-life of banana can be extended by transporting them under optimum conditions of temperature, relative humidity and composition of the atmosphere, elimination of ethylene and use of ripening retardants (Kader, 2002). Recently, 1-Methylcyclopropene (1-MCP) has been employed to increase the shelf-life of some horticultural commodities. By binding to the ethylene receptors, 1-MCP acts as an efficient ethylene antagonist and its effects can persist for a long time (Sisler *et al*., 2003). It can therefore, slow down the ripening process as well as senescence of the fruit (Sisler and Serek, 1997). Banana Cv. Robusta dipped in 6% wax gave shelf life of 13days in room storage and 19 days in Zero energy cool chambers and 24 days in cold storage (Doshi and Sutar, 2010). The gum Arabic 10% incorporated with 1.0% chitosan act as a bio fungicide for controlling anthracnose in banana (Maqbool, 2010). Dipping of fruits in 1.5% or 2.5% Tal-prolong solution delayed yellow colour development by 4-8 days. Dwarf Cavendish

dipped in 6% wax increase the green life by 40 days (Saravanan, *et al*., 2013).

Materials and Methods

The experiment was laid out in Completely Randomized Design (CRD) consisting three replications and 12 treatments. Fruits were harvested at physiological stage of maturity. Fruits were graded, washed and dried under fan. After that fruits were treated with 1-Methylcyclopropene (1-MCP) at three concentrations 5ppm, 10ppm and 15ppm for 6 hr. duration, Putrescine (1mM), Spermidine (0.5mM) and Wax (6%). Details of treatment is as below:

Treatment details			
T_1	1-MCP- 5 ppm.	T_7	1-MCP- 5ppm + Wax 6%.
T_2	1-MCP-10 ppm.	T_8	1-MCP- 10ppm + Wax 6%.
T_3	1-MCP-15 ppm.	T_9	1-MCP- 15ppm + Wax 6%.
T_4	Putrescine (1 mM).	T_{10}	Putrescine +Wax 6%.
T_5	Spermidine (0.5 mM).	T_{11}	Spermidine + Wax 6%.
T_6	Wax 6%.	T_{12}	Control.

Results and Discussion

The results have shown that, the value of titratable acidity was decreased during ambient storage. Initially, the higher titratable acidity was found in treatment T_3 (0.67%) followed by T_{12} (0.66%) and T_{10} (0.66%). At 7th day of observation, the higher value of titratable acidity was recorded in treatment T_7 (0.63%) while minimum acidity was observed in treatment T_{12} (0.54%). At 14th day of ambient storage the maximum value of titratable acidity was found in treatment T_7 (0.60%) and whereas the minimum value of titratable acidity was recorded in treatment T_{12} (0.46%). At 21st and 28th days of ambient storage of banana fruit the maximum acidity was found in treatment T_7 (0.58% and 0.54%, respectively).

The result has revealed that, the value of TSS was significantly increased by the various treatments and the days of ambient storage under ambient temperature during the initial day of observation, the least value of TSS have shown in treatment T_{11} and T_2 (3.3%) and the higher value was observed in treatment T_{12} (3.8%).During 7th day of observation, the least value of TSS was recorded T_7 (5.22%) while the highest TSS value was observed in control treatments T_{12} (10.60%). During 14th day of ambient storage the least value of TSS was observed in treatment T_7 (8.84) whereas the highest value of TSS was found in treatment T_{12} (22.35%).During 21stand 28th days of observations, T_7 have shown the least value of TSS (11.30% and 15.5%, respectively).

At initial day of observation, the highest value (19.98 mg/100g) of ascorbic acid was shown in treatment T_3, while lowest in respect of ascorbic acid content was found in treatment T_{12} (19.12 mg/100g). At 7th day of ambient storage the highest ascorbic acid value was recorded in treatment T_7 (16.10 mg/100g), while lowest ascorbic acid was found in treatment T_{12} (11.95 mg/100g). During 14th day of ambient storage the highest ascorbic acid value was recorded in treatment T_7 (14.83 mg/100g), while lowest value was recorded in treatment T_{12} (9.07 mg/100g). During 21st and 28th day of observation, the highest value of ascorbic acid content was recorded in treatment T_7 (12.40 mg/100g and 11.28 mg/100g, respectively).

The obtained results have revealed that, the value of reducing sugars content was significantly increased by the various treatments and the days of ambient storage under ambient temperature.

Table.1 Effect of post-harvest treatments on physicochemical composition ofBanana (*Musa paradisica* L.) cv. Grand Naine

Treatment details		Titratable acidity (%)	Total soluble solids (%)	Ascorbic acid (mg/100g)	Reducing sugar (%)	Non Reducing sugar (%)	Total sugars (%)
28 DAYS							
T_1	**1-MCP- 5 ppm.**	0.52	18.12	10.57	12.56	7.98	20.54
T_2	**1-MCP-10 ppm.**	0.46	16.20	10.60	13.10	7.83	20.93
T_3	**1-MCP-15 ppm.**	0.37	18.20	10.00	12.00	7.44	19.44
T_4	**Putrescine (1 mM).**	0.44	16.6	10.17	12.00	7.68	19.68
T_5	**Spermidine (0.5 mM).**	0.42	18.5	9.32	11.34	7.42	18.76
T_6	**Wax 6%.**	0.48	18.4	9.40	11.24	7.33	18.57
T_7	**1-MCP- 5ppm + Wax 6%.**	0.54	15.5	11.28	13.20	8.62	21.82
T_8	**1-MCP- 10ppm + Wax 6%.**	0.49	16.0	10.94	13.14	7.88	21.02
T_9	**1-MCP- 15ppm + Wax 6%.**	0.39	18.7	10.02	11.82	7.48	19.3
T_{10}	**Putrescine +Wax 6%.**	0.46	19.6	10.27	12.10	7.85	19.95
T_{11}	**Spermidine + Wax 6%.**	0.37	18.6	9.30	10.88	7.18	18.06
T_{12}	**Control.**	-	-	-	-	-	-
	S.E.+	0.05	0.6	1.41	1.03	0.31	1.04
	C.D.@5%	0.14	1.81	N/A	3.05	0.94	3.05

At initial day of observations, the highest value (10.70%) of reducing sugars was shown in treatment T12, while lowest in respect of reducing sugars content was found in treatment T4 (9.79%). At 7th day of ambient storage the highest reducing sugars value was recorded in treatment T12 (10.81%), while lowest reducing sugars was found in treatment T6 (10.15%) (Table 1).

During 14th day of ambient storage the highest reducing sugars value was recorded in treatment T_7 (11.29%), while lowest value was recorded in treatment T_6 (10.42%). During 21st and 28th day of observation, the highest value of reducing sugars content was recorded in treatment T_7 (12.68% and 13.20%, respectively).

The obtained results have revealed that, the value of non-reducing sugars content was significantly increased by the various treatments and the days of ambient storage under ambient temperature. At initial day of observations, the highest value (10.70%) of non-reducing sugars was shown in treatment T_{10}, while lowest in respect of non-reducing sugars content was found in treatment T_2 (6.07%). At 7th day of ambient storage the highest non reducing sugars value was recorded in treatment T_7 (7.32%), while lowest non-reducing sugars was found in treatment T_9 (6.30%). During 14th day of ambient storage the highest non reducing sugars value was recorded in treatment T_7 (7.53%), while lowest value was recorded in treatment T_2 (6.60%). During 21st and 28th day of observation, the highest value of non-reducing sugars content was recorded in treatment T_7 (7.43% and 7.88%, respectively).

The obtained results revealed that, the value of total sugars content was significantly increased by the various treatments and the days of ambient storage under ambient temperature. At initial day of observation, the highest value (17.48%) of total sugars was shown in treatment T_7, while lowest in respect of total sugars content was found in treatment T_4 (15.97%). At 7th day of ambient storage the highest total sugars value was recorded in treatment T_7 (17.91%), while lowest total sugars was found in treatment T_4 (16.59%). During 14th day of ambient storage the highest total sugars value was recorded in treatment T_7 (18.82%), while lowest value was recorded in treatment T_{11} (17.23%). During 21st and 28th day of observation, the highest value of total sugars content was recorded in treatment T_7 (20.68% and 21.82%, respectively).

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