

Effect of post harvest chemical treatments on shelf life and physico-chemical quality of banana cv. HARICHHAL

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ABSTRACT

Banana is tropical fruit having great demand all over the world. Yet fruit dealers find difficulties in marketing banana in good condition because of its very short post harvest life due to severe biochemical changes during ripening and storage difficulties under refrigerated conditions. The experiment was undertaken to study the post harvest change of banana cultivar Harichhal at Department of Horticulture, C.S. Azad University of Agriculture and Technology, Kanpur to study the effect of post harvest chemical treatments on shelf life and physico-chemical quality of banana cv. Harichhal. Banana bunches were dipped in aqueous solution of growth regulators viz. 2, 4, 5-T(25,50,125,250 and 300 ppm), I.A.A.(25 and 50 ppm) and GA₃ (150 and 200 ppm) concentrations for 30 second, air dried and kept at ambient condition (25° to 30°C) at 13±1° (BOD) temperature condition. It has been inferred that at ambient storage condition maximum (8.3 days) green life can be obtained with GA₃ treatment at 200 ppm. Shelf life of banana can be extended up to 11 days at room temperature and 32 day at 13±1°C temperature condition by dipping the bunches in GA₃ solution of 150 ppm. Banana treated with I.A.A. 50 ppm showed an enhanced ripening compared to control (without treatment).

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Banana is gaining importance in fruit cultivation in subtropical zone at Central Plains of U.P. due to its higher productivity and throughout the year production. However, banana being a delicate and highly perishable fruit, the local production is subjected to serious post harvest losses, mainly due to poor handling and crude storage practices. Harichhal is a semi tall sport of Dwarf Cavendish. It is the important banana variety of this region. Appropriate post harvest handling of this variety for the agroclimatic region of Central Plains of Uttar Pradesh are yet to be standardized. The growth regulators such as 2,4,5-Trichlorophenoxy acetic acid and gibberellic acid when used at low concentration have been reported to control the ripening of fruits (Sadasiwami and Muthuswami, 1973). It has been observed that during refrigerated shipment of banana, changes in chamber temperature owing to variation in power supplies and cooling equipments efficiency lead to chilling damage and fruit losses. Hence, in order to reduce fruit losses information on the effect of storage temperature is crucial, especially when a new banana variety is to be transported over long distances. Studies were, therefore, carried out on the control of post harvest losses by extending shelf life with the help of plant growth regulators and temperature conditions.

MATERIALS AND METHODS

The experiment was undertaken at the Department

of Horticulture, C.S. Azad University of Agriculture and Technology, Kanpur during the year 2005-06 to study the post harvest life and biochemical changes occurring in banana cultivar Harichhal during storage. Fresh and healthy banana hands were deheaded and five banana hands from the banana bunches were treated under CRD design. The banana bunches were dipped in aqueous solutions of growth regulators viz. 2,4,5-T(25,50,125,250 and 300 ppm), IAA(25 and 50 ppm) and GA₃ (150 and 200 ppm) concentrations for 30 seconds, air dried and kept at ambient condition (25° to 30°C) and at 13±1°C (BOD) temperature condition. The chemicals were first dissolved in 5 ml of ethyl alcohol and then diluted with distilled water. The data were recorded for green life, yellow life, TSS, total sugar and starch contents. The TSS was determined by titrating the aqueous extract of fruit tissue against 0.1 N NaOH using phenolphthalein indicator. Total sugar and starch were estimated as suggested by Ranganna (1979). The data were recorded at the end of green and yellow life. The green life was the duration in days from harvesting till it turned yellow, while yellow life was number of days from turning yellow till it started to rot.

RESULTS AND DISCUSSION

The results on ripening duration, shelf life and physico-chemical indices subject to growth regulators varied with their concentrations. The result (Table 1) indicated that

Table 1: Effect of growth regulators and temperature on shelf life and physico chemical properties of banana during storage

Treatments	Green life days		Yellow life days		Shelf life days		TSS O brix		Total sugars(%)		Starch content (%)	
	Room Temp.	13±1°C	Room Temp.	13±1°C	Room Temp.	13±1°C	Room Temp.	13±1°C	Room Temp.	13±1°C	Room Temp.	13±1°C
2,4,5-T 25 ppm	7.5	20.8	3.4	8.3	10.9	29.1	24.3	22.4	22.44	19.33	5.25	6.32
2,4,5-T 50 ppm	7.1	19.7	3.3	8.1	10.4	27.8	23.9	22.7	21.85	19.21	5.75	6.45
2,4,5-T 125 ppm	6.2	16.2	2.8	6.7	9.0	22.9	24.1	21.6	22.75	20.45	4.80	5.76
2,4,5-T 250 ppm	5.8	15.7	2.6	6.5	8.0	22.2	24.3	21.5	23.13	21.12	4.71	5.38
2,4,5-T 300 ppm	5.3	14.5	2.4	5.1	7.7	19.6	24.2	21.3	23.24	21.33	4.62	5.23
IAA 25 ppm	4.8	10.6	2.1	3.2	6.9	13.8	23.8	23.6	23.33	22.45	4.39	5.15
IAA 50 ppm	4.7	8.2	2.1	3.1	6.8	13.3	23.9	23.9	23.75	22.75	4.25	4.72
GA ₃ 150 ppm	8.1	23.9	3.6	8.2	11.7	32.1	22.7	21.3	22.21	18.68	6.71	6.41
GA ₃ 200 ppm	8.3	22.8	3.7	7.3	12.0	31.1	23.4	21.1	19.75	19.32	6.86	6.36
Control	5.2	18.1	2.6	11.8	7.8	29.9	24.1	21.2	20.21	19.45	4.41	4.66
C.D. (P=0.05)	Treatments 0.29		Treatments 0.39		Treatments 0.61		Treatments 0.21		Treatments 0.20		Treatments 0.14	
	Storage 0.13		Storage 0.18		Storage 0.10		Storage 0.10		Storage 0.09		Storage 0.07	
	Interaction 0.41		Interaction 0.56		Interaction 0.30		Interaction 0.30		Interaction 0.27		Interaction 0.20	

the treatments of banana with growth regulators influenced ripening of fruits significantly. Indole acetic acid treatments considerably increased the total sugar followed by ripening of fruits. Lower concentration of 2,4,5-T (25 and 50 ppm) retarded the ripening appreciably and such fruits could be held in firm condition even after 9 to 10 days of storage at ambient storage condition.

At ambient condition significantly greater green life was obtained with GA₃ 200 ppm (8.3 days) followed by GA₃ 150 ppm (8.1 days), 2,4, 5-T 25 ppm (7.5 days), 2,4, 5-T 50 ppm (7.1 days) as compared to control (5.2 days). Whereas, Indole acetic acid 25 ppm lowered green as well as yellow life significantly (4.8 and 4.7 days, respectively) as compared to control at ambient temperature. The maximum self life (32.1 days) was found with GA₃ at 150 ppm kept under cold temperature (13±1°C) condition.

The TSS content was noted maximum (24.36°B) under 2,4,5-T at 250 ppm as compared to 24.1° Brix under control in ambient conditions. It was found lower in all the treatments at low temperature (13±1°C) condition as compared to ambient condition. Total sugar was found maximum IAA 50 ppm (23.75%) being significantly higher than other treatments and control (20.21%) at ambient condition. In all the treatments total sugar was higher at ambient storage as compared to 13±1°C storage condition. It may be attributed to the lower temperature which slowed down the physiological activities of fruit *i.e.* respiration and production of ethylene (Lebibet *et al.*, 1995). On the contrary, higher starch content was augmented under 13±1°C storage condition as compared to ambient storage condition in all the treatments except GA₃ which is in conformity with the observations of

Shivshankar (2003).

Post harvest dipping of three quarter ripe Harichhal banana hands in 25 or 50 ppm 2,4,5-T hastened ripening at room temperature by 4-6 days. GA₃ 200 ppm treatment also hastened it by 5-6 days. The shelf life was extended up to 11 days 13±1°C at room temperature and 32 days at 13±1°C temperature condition by dipping banana bunches in GA₃ 150 ppm solution. Desai and Deshpande (1978) observed that the relative activities of alpha amylase, starch, phosphorylase, acid phosphate peroxidase and catalase were decreased markedly in banana cv. DWARF Canvendish fruits treated with GA₃ 50 ppm. However, banana treated with IAA 25 ppm showed an enhanced ripening compared to control. The appreciably higher values of total sugars, glowing fruit colour, acidity and ascorbic acid obtained under indole acetic acid treatment are probably the results of enhanced ripening through increased production of ethylene in response to the hormone treatment. The results obtained suggest that self life of banana can be controlled chemically which is in agreement with the reports of Shivshankar (2003).

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REFERENCES

Desai, B.B. and Deshpande, P.B. (1978). Effect of study of maturity on some physical and biochemical constituents and enzyme activities of banana. *Mysore J. Agric. Sci.*, **12** : 193-200.

Lebibet, D., Metzidakis, I. and Gerasopoulos, D. (1995). Effects of storage temperatures on the ripening response of banana fruit frown in the mild winter climate of Crete. *Acta Hort.*, **379** : 521-526.

Ranganna, S. (1979). *Manual of analysis of fruits and vegetable products*. Tata McGraw Hill Publishing Co., New Delhi.

Sadasivam, S. and Muthuswami, S. (1973). Regulate banana ripening. *Indian Hort.*, **18** : 1- 20.

Shivshankar, S. (2003). Studies on the fruit quality parameters of Neypoovan and Burrocensa banana varieties stored at low temperature. *Indian J. Hort.*, **60** (4) : 329.
