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Effect of NAA and MH on postharvest quality of potato (*Solanum tuberosum* L.)

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ABSTRACT
An experiment was conducted at Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal, India to assess the storage behavior of potato tuber by dipping different concentrations (1000, 2000 and 3000 ppm) and combinations of NAA and MH. Various biochemical parameter viz. reducing & total sugar, ascorbic acid, starch, phenol content were studied during the period of experimentation. During the storage period, starch, total sugar, ascorbic acid and phenol content were found to reduce slightly in all instances. However, the reduction was least in case of NAA 2000 ppm and it was highest in tubers kept under control. Reducing sugar was found to increase in most of the cases but the increment was least with NAA 1000 ppm.

Key words : Potato, NAA, MH, Post harvest, Quality.

INTRODUCTION

Potato (*Solanum tuberosum* L.) is an important tuber crop of India. Problems related to storage have been identified as a major constrain for achieving further increase in production of potato in India (Singh and Verma, 1981). Several attempts have been made to reduce the storage loss of potato. Losses in stored potato are due to sprouting, shrinkage, and rotting (Singh and Verma, 1981). A major component of managing potato quality in storage is effective sprout inhibition. Sprouting causes increased weight loss, reduced tuber quality and impedes air movement through the potato pile (Kleinkopf *et al.*, 2003). Many chemicals have been tried either as preharvest spray or as postharvest dipping to increase the shelf life of potato. Postharvest application of sodium salt of *alpha*-naphthalene acetic acid 1000 ppm was found to be effective in controlling sprouting of potato (Rama and Narasimham, 1989). Preharvest application of MH to suppress sprout growth was examined by Sukumaran *et al.,* 1981. Present study was designed to evaluate the effectiveness of different concentrations and combinations of NAA and MH as postharvest dipping in reducing storage loss in potato.

MATERIALS AND METHODS

The experiment was carried out at the department of Pomology and Postharvest Technology, Faculty of Horticulture, Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal, India during mid-April to mid-August, 2003. The experiment was laid out in Randomized Block Design with three replications. The effect of sixteen different treatments, using different concentrations and combination of NAA and MH, on postharvest life of potato were evaluated during the course of entire experimentation. Five kilograms of potato for each replication was dipped in growth regulator solutions for 30 minutes. Dipping in normal water was taken as control. Observations on starch, reducing sugar, total sugar, ascorbic acid and phenol content were recoded at regular interval. Starch, reducing sugar, total sugar, ascorbic acid and phenol content on fresh weight basis were analyzed as per methods suggested by Ranganna (1997). The statistical analysis was done as per methods describe in Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Initial concentrations of different biochemical parameters are shown in Table: 1. During storage, concentration of starch was shown to decrease in all instances. The minimum reduction was recorded with NAA 2000 ppm dipping followed by NAA 1000 ppm and NAA 3000 ppm at the end of 120 days storage. Maximum reduction in starch content was observed with tubers under control (Table: 2).

In most of the cases, there was an increase in reducing sugar content. The increment was minimum with NAA 1000 ppm followed by NAA 2000 ppm and NAA 3000 ppm. The increment was highest for control. Total sugar was found to decrease as the storage period advanced. But, the reduction was less in different treatments of NAA. The reduction was highest with tubers under control. This may be due to the utilization of sugar by more number of sprouting in tubers under control.

There is a gradual decrease in both ascorbic acid and phenol content (Table: 3). NAA 2000 ppm dipping recorded minimum reduction in both ascorbic acid and phenol content. Maximum reduction was recorded with control. More than 50% ascorbic acid was lost in control. Reduction in ascorbic acid and phenol content with NAA 1000 ppm and NAA 3000 ppm were statistically on par.

From the above discussion, it may be concluded that potato dipped in 2000 ppm NAA is superior to any other treatment used in this experiment.

Table 1 : Initial concentration of different biochemical parameters of potato.

Biochemical parameters	Concentration
Starch	15.60%
Reducing sugar	0.53%
Total sugar	3.17%
Ascorbic acid	19.7 mg / 100g fresh weight
Phenol	159.38 mg / 100g fresh weight

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Table2 : Effect of different concentration of NAA and MH on starch, reducing sugar and total sugar content of potato

Treatments	Starch (%)			Reducing Sugars (%)			Total sugars (%)		
	30days	60days	120days	30days	60days	120days	30days	60days	120days
NAA 1000 ppm	15.03	14.69	14.09	0.59	0.57	0.57	3.15	2.83	2.84
	(22.81)	(22.53)	(22.04)	(4.41)	(4.34)	(4.32)	(10.22)	(9.88)	(9.70)
NAA 2000 ppm	15.18	14.95	14.23	0.61	0.62	0.61	3.04	2.83	2.75
	(22.93)	(22.75)	(22.16)	(4.47)	(4.53)	(4.47)	(10.04)	(9.68)	(9.55)
NAA 3000 ppm	14.85	14.61	14.08	0.59	0.61	0.61	3.13	3.08	2.83
	(22.67)	(22.47)	(22.04)	(4.41)	(4.47)	(4.48)	(10.19)	(10.11)	(9.68)
MH 1000 ppm	14.06	13.62	13.04	0.57	0.58	0.60	2.74	2.62	2.47
	(22.02)	(21.66)	(21.17)	(4.32)	(4.38)	(4.43)	(9.53)	(9.32)	(9.04)
MH 2000 ppm	13.96	13.76	13.16	0.56	0.56	0.58	2.90	2.76	2.36
	(21.94)	(21.77)	(21.27)	(4.28)	(4.33)	(4.38)	(9.80)	(9.56)	(8.84)
MH 3000 ppm	13.90	13.54	12.96	0.56	0.57	0.59	2.75	2.47	2.35
	(21.89)	(21.59)	(21.10)	(4.28)	(4.32)	(4.39)	(9.55)	(9.04)	(8.82)
NAA 1000 ppm +	14.77	14.26	13.70	0.58	0.59	0.60	3.00	2.90	2.80
MH 1000 ppm	(22.61)	(22.18)	(21.72)	(4.37)	(4.41)	(4.44)	(10.01)	(9.80)	(9.63)
NAA 1000 ppm +	14.79	14.16	13.60	0.55	0.57	0.60	3.09	2.98	2.81
MH 2000 ppm	(22.61)	(22.10)	(21.64)	(4.25)	(4.34)	(4.30)	(10.12)	(9.44)	(9.65)
NAA 1000 ppm +	14.57	14.16	13.50	0.54	0.57	0.61	2.93	2.85	2.47
MH 3000 ppm	(22.44)	(22.10)	(21.56)	(4.21)	(4.33)	(4.35)	(9.86)	(9.72)	(9.04)
NAA 2000 ppm +	14.40	13.97	13.23	0.54	0.57	0.60	3.09	2.79	2.37
MH 1000 ppm	(22.31)	(21.95)	(21.66)	(4.21)	(4.33)	(4.44)	(10.12)	(9.62)	(9.86)
NAA 2000 ppm +	14.25	13.82	13.12	0.57	0.61	0.63	3.03	2.85	2.45
MH 2000 ppm	(22.18)	(21.83)	(21.24)	(4.33)	(4.48)	(4.55)	(10.02)	(9.72)	(9.01)
NAA 2000 ppm +	14.13	13.62	12.94	0.54	0.58	0.61	2.98	2.91	2.86
MH 3000 ppm	(22.08)	(21.66)	(21.08)	(4.21)	(4.37)	(4.48)	(9.95)	(9.82)	(9.74)
NAA 3000 ppm +	13.90	13.37	12.85	0.56	0.59	0.61	2.93	2.74	2.55
MH 1000 ppm	(21.89)	(21.45)	(21.00)	(4.29)	(4.41)	(4.48)	(9.86)	(9.53)	(9.19)
NAA 3000 ppm +	13.87	13.15	12.64	0.57	0.61	0.63	3.02	2.86	2.43
MH 2000 ppm	(21.87)	(21.26)	(20.83)	(4.33)	(4.48)	(4.55)	(10.01)	(9.74)	(8.97)
NAA 3000 ppm +	13.98	13.07	12.44	0.55	0.60	0.63	2.97	2.61	2.42
MH 3000 ppm	(21.95)	(21.19)	(20.65)	(4.25)	(4.44)	(4.55)	(9.92)	(9.30)	(8.95)
Control	13.64	12.77	12.15	0.59	0.65	0.71	2.44	2.21	2.03
	(21.68)	(20.95)	(20.61)	(4.34)	(4.62)	(4.83)	(8.99)	(8.55)	(8.19)
SE(m)±	0.05	0.05	0.11	0.03	0.02	0.04	0.10	0.10	0.06
CD at 5%	0.14	0.14	0.32	0.09	0.06	0.12	0.29	0.29	0.17

Angular transformed values are given in parentheses

Table 3 : Effect of different concentration of NAA and MH on ascorbic acid and phenol content of potato.

Treatments	Ascorbic Acid (mg/100g)		Phenol (mg/100g)	
	30days	60days	120days	120days
NAA 1000 ppm	17.60	15.50	13.67	127.54
NAA 2000 ppm	18.50	16.28	14.60	128.70
NAA 3000 ppm	17.15	15.80	13.48	123.28
MH 1000 ppm	16.70	14.90	12.62	113.90
MH 2000 ppm	16.70	14.60	11.90	123.21
MH 3000 ppm	16.25	14.45	11.90	117.11
NAA 1000 ppm +MH 1000 ppm	17.15	15.50	11.00	108.44
NAA 1000 ppm +MH 2000 ppm	17.00	15.05	11.00	104.10
NAA 1000 ppm +MH 3000 ppm	16.85	14.75	10.70	110.46
NAA 2000 ppm +MH 1000 ppm	16.40	13.85	11.90	118.15
NAA 2000 ppm +MH 2000 ppm	15.95	13.25	11.00	116.83
NAA 2000 ppm +MH 3000 ppm	15.95	12.95	11.30	108.83
NAA 3000 ppm +MH 1000 ppm	15.80	13.70	10.25	102.71
NAA 3000 ppm +MH 2000 ppm	15.65	13.25	9.95	120.43
NAA 3000 ppm +MH 3000 ppm	15.35	12.95	9.65	121.31
Control	14.75	12.05	9.05	99.13
SE(m)±	0.18	0.27	0.24	3.15
CD at 5%	0.52	0.78	0.69	9.07

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