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Vitamin C Content in Ultra-Violet-C Irradiated Tomatoes

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Abstract: *The effect of ultra-violet irradiation (UV-C) on vitamin-C content in fresh cut tomatoes was investigated. Fresh tomatoes (Lycopersicon esculentum) were blanched at 60^0c for 5 min and cut into equal size pieces. Tomatoes of 100g(Sample-A) exposed to UV-C of 254nm, 3.6 KJ for 5 minutes, and to sample B 5% of garlic was added as natural preservative, in addition to UV-C treatment. The sample-C was kept as control without any treatment. The mean vitamin-C content in sample A and B was significantly more than the sample C. The shelf life of sample A and B extended up to 45 days without deterioration. So UV energy can be used safely to extend the shelf-life of tomatoes.*

Keywords: *Garlic, Shelf-life, Tomatoes, UV-C Irradiation, vitamin-C*

I. Introduction

Tomato is the world's largest vegetable crop. The lycopene and vitamin C present are powerful antioxidants helps in preventing the degenerative diseases [1, 2, 3].The emerging technology UV-C irradiation is a type of non-ionizing radiation.UV-C irradiation at 245 nm has the highest germicidal action, surface decontamination and the control of microorganisms growth in fresh cut products.[4].Natural antimicrobial compounds are re -emerging alternative to fresh cut tomatoes and its products preservation. Garlic constituents possess broad spectrum of antibiotic effects, antiseptic, antifungal and antimicrobial both internally as well as externally [5]. The present study was to analyze the vitamin- C content of fresh cut tomatoes exposed to UV-C irradiation and natural preservative garlic.

II. Materials And Methods

Fresh tomatoes of local breed (*Lycopersicon esculentum*) with uniform size, shape and ripened fruits were collected from agricultural nursery.

1.1 Processing of raw materials

Fresh tomatoes were collected, washed with distilled water and were blanched at 60^0 c for 5 mins and were cut into pieces and filled into pre sterilized containers and stored at 10°c in a refrigerator for further study.

1.2 UV-C irradiation method:-

A low pressure mercury vapour discharge (Phillips germicidal sterile) lamp with a tubular glass envelope emitting short wave UV radiation with a peak of 254 nm (UV-C) with 3.6 kJ/m^2 exposed for 5 min according to the procedure described by Steven's et al (1998) [6].

1.3 Preparation of samples:-

1.3.1 Sample A: Tomatoes of 100g were taken into pre sterilized containers were exposed to UV radiation for about 5 minutes and stored at 10°c in a refrigerator.

1.3.2 Sample B: - To 100g of tomatoes 5% (5g/100g) of garlic paste was added as natural preservative and exposed to UV light for about 5 min.

1.3.3 Sample C: - Control is a sample of tomatoes without any treatment.

1.4 Shelf life studies

All the samples (A, B & C) were stored in refrigeration conditions at temperature 10 $\pm 2^0$C and studied for a period of 45 days. At an interval of every 4 days each sample (A, B & C) was taken and analyzed for ascorbic acid.

1.4.1 Estimation of vitamin – C:-

The procedure for estimation of Vitamin –C (ascorbic acid AA) was followed as mentioned in AOAC methods 1990 [7].

1.4.2 Statistical analysis:-

The data was analyzed using appropriate statistical tests one way ANOVA for comparing the average value of the (parameter) ascorbic acid among the treatments. Duncan's multiple range test (DMRT) was used to compare the mean values between pair of treatments.

III. Results And Discussion

Vitamin C is also known as ascorbic acid easily destroyed by oxidation especially at high temperature and easily lost during processing, for preservation. The ascorbic acid content was analyzedfor a period of 45 days at an interval of 4 days. The mean vitamin C content of the sample A, B and C (Table no: 1) was 15.16, and 16.91 and 10.55mg/100 g of tomato cuts. The vitamin C content of sample A and B was not significantly different. The vitamin C content between sample A and C and sample B and C was significantly different ($P<0.062$, $P<0.4166$). There was a significant difference between the samples in vitamin C content (one way ANOVA) ($F-5.32$, $P=0.047$).The control sample was deteriorated after 28^{th} day where as the shelf life of sample A and B extended up to 44 days.

TABLE 1:- Effect of UV-C and garlic on vitamin C content of tomatoes

VITAMIN C		
S.NO	SAMPLES	MEAN ± Std deviation
1	A (UV-C Treated) mg/100g	15.16 ± 2.0209^{a}
2	B (UV-C + Garlic Treated) mg/100g	16.91 ± 2.1857^{a}
3	C (Without Treatment) mg/100g	10.55 ± 3.0623^{b}

*Means having the same super scripts do not differ significantly

Exposing of fresh fruits and vegetables with UV-C is a new approach to extend the storage life of fresh horticulture crops.UV.-C irradiation had no significant effect on citric acid content of treated "Tommy Atkins" mango [8].A reduction in total ascorbic acid content of UV-C irradiated fresh cut mango fruits when compared with control fruits was reported by Gonzalez-Aguilar e tal [9]. In the present study also there is no significant effect of UV-C on the vitamin C content of cut tomatoes.

IV. Conclusion

Considering the increasing demands of consumers, the use of safe emerging technologies and additives based on natural compounds could be an alternative in the preservation of fresh cut fruits and vegetables. Thus the technologies are applicable to extend the shelf – life of fresh cuts.

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