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Research Article

EFFECT OF DIFFERENT CHEMICALS AND TEMPERATURES ON SHELF LIFE OF KAKROL (*MOMORDICA DIOICA* Roxb.)

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ABSTRACT

The studies on the effect of different chemicals on shelf life of kakrol fruits revealed that among different chemical treatments, GA_3 10 ppm treated fruits recorded lower physiological loss in weight and spoilage percentage. While the quality parameters like total soluble solids, titrable acidity, ascorbic acid content, reducing sugars and organoleptic score recorded the higher values with GA_3 10 ppm compared to all other treatments and under both storage conditions. There was a gradual increase in physiological loss in weight and spoilage percentage with increase in days of storage. In case of total soluble solids, there was increase in initial days of storage and decrease in later days of storage whereas titrable acidity, reducing sugars, ascorbic acid content and organoleptic score decreased with the increase in storage period irrespective of chemical treatments. Between two conditions of storage, fruits in cold storage could be stored for more number of days (six days) as compared to room temperature (four days). Similar trend was observed with all other parameters except with total soluble solids where in there was decrease with increase in days of storage irrespective of chemical treatments.

Keywords: *Kakrol, Chemicals, GA_3, Benzyl Adenine, Benzoic Acid*

INTRODCUTION

Kakrol (*Momordica dioica* Roxb.) (2n = 2x = 28) is a cucurbitaceous, dioecious perennial vegetable. The fruit of *M. dioica* is nutritious and recognized as diuretic and laxative possessing vitamin C. Fruits are used against diabetes, malaria, allergy and inflammatory problems. Fruits are also used to cure ulcers, piles, sores and obstruction of liver and spleen. It also possesses several other medicinal properties and is good for those suffering from cough and digestive problems. The unripe fruits are sweet, oily and laxative. The seeds are used for chest problems and stimulate urinary discharge.

Vegetables are highly perishable because of their higher respiration rate. Extension of storage life of perishable fruits and vegetables can be achieved by a variety of techniques. Post harvest application of chemicals has known to play a spectacular role in improving the quality of many fruits and vegetables.

Keeping the above facts in view, the present investigation entitled effect of different chemicals and temperatures on shelf life of kakrol (*Momordica dioica* Roxb.) was conducted.

MATERIALS AND METHODS

The present investigation was conducted at post harvest technology laboratory, ANGRAU, with 13 treatments and 3 Replications following factorial CRD**.** The Treatments are as follows i.e T_1- Gibberellic acid 10 ppm, T_2- Gibberellic acid 20 ppm, T_3- Benzyl adenine 10 ppm, T_4-Benzyle adenine 20 ppm, T_5- EDTA 10 ppm, T_6- EDTA 20 ppm, T_7- Ascorbic acid 10 ppm, T_8- Ascorbic acid 20 ppm, T_9- Benzoic acid 10 ppm,T_{10}- Benzoic acid 20 ppm,T_{11}- Hydrogen peroxide 10 ppm,T_{12}- Hydrogen peroxide 20 ppm and T_{13}- Control and data recorded on Physiological loss in weight, Percentage of spoilage, Ascorbic acid, TSS, Reducing sugars, Titrable acidity and organoleptic scoring were estimated as per standard procedures. The data were subjected to statistical analysis as per the procedure out lined by Panse and Sukhatme (1967).

RESULTS AND DISCUSSION

In the present investigation, the fruits treated with different chemicals were stored under two storage conditions *i.e.*, at room temperature (22 ± 2°C) and at cold storage (16°C). The fruits were stored for four days at room temperature and six days in cold storage. The shelf life was extended by two days in the fruits stored in cold storage than at room temperature. This might be due to lower respiration rate and reduced moisture losses in cold storage.

There was an increased physiological loss in weight as the storage period increased under two storage conditions with different chemicals. The losses being maximum under room temperature ranging from 8.30 per cent with Gibberellic acid 10 ppm to 14.19 with control in a storage period of four days. In cold storage it ranged from 0.27 with GA_3 10 ppm to 0.37 with control in a storage period of six days. The percentage reduction of PLW in cold storage with GA_3 10 ppm over control is 27.02 per cent. The reduced losses under cold storage are due to the maintenance of high relative humidity and relatively low temperatures as compared to room temperature. Treating the kakrol fruits with different chemicals reduced the PLW as compared to control. It was observed that GA_3 10 ppm under two conditions of storage reduced the moisture loss to a greater extent. This might be due to the increasing affinity of the cell to water which can retain more water against the forces of evaporation resulting in lesser weight loss during storage by altering some of the proteinaceous constituents of the cell. Masalkar *et al.*, (2006) in mango reported increase in physiological loss in weight with increase in days of storage.

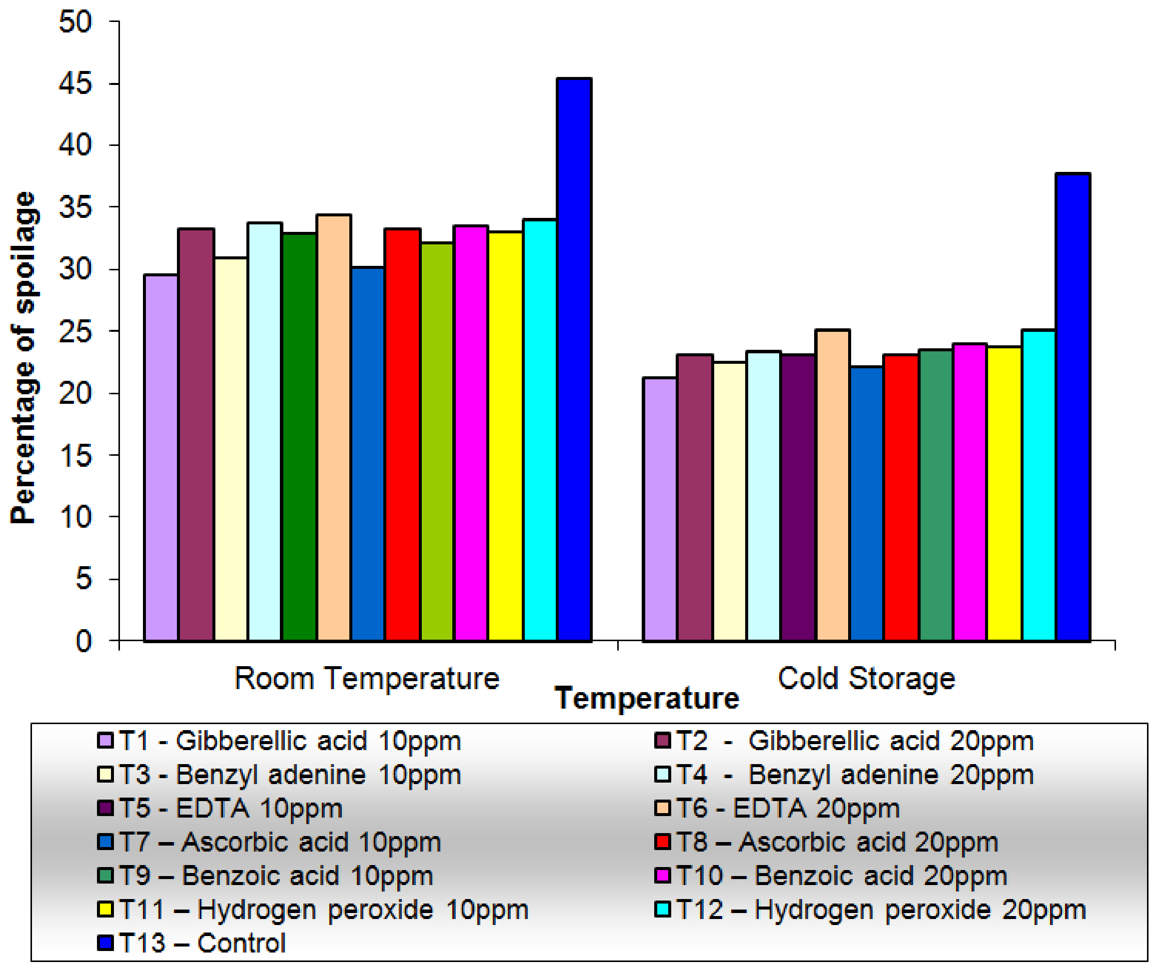

Figure 1: Effect of different chemicals on percentage of spoilage in kakrol fruits at room temperature and cold storage

Spoilage was observed in the form of shriveling, ripening and pathogen attack. The fruits treated with different chemicals reduced the percentage of spoilage over control under both temperature conditions. The maximum reduction in spoilage was recorded in fruits treated with GA_3 10 ppm (29.55) at room temperature and the range of spoilage percentage from 29.55 with GA_3 10 ppm to 45.44 with control. Fruits stored under low temperature were free from spoilage for a longer storage period (6 days) and the spoilage percentage ranged from 21.25 with GA_3 10 ppm to 37.67 with control. The decreased spoilage with GA_3 10 ppm could be due to antagonistic effect of GA_3 against ethylene production and also delay in senescence at low temperatures. Puzari (1999) in spine gourd also reported increase in spoilage percentage with increase in days of storage (Figure 1).

The kakrol fruits treated with chemicals were stored under two storage conditions and various quality parameters were observed during storage period. There was initial rise in the TSS upto two days and thereafter it declined upto 4th day of storage at room temperature irrespective of chemical treatments. The TSS ranged from 4.61 with control to 5.08 with GA_3 10 ppm. The initial rise in TSS upto two days may be due to the more water losses from the fruits through evapo transpiration while the decrease in TSS at later stages may be due to rapid utilization of soluble fraction as respiratory substrate.

The fruits stored in cold storage showed progressive decrease in TSS without any rise. The TSS during storage ranged from 4.61 with control to 5.08 with GA_3 10 ppm during 6 days of storage period due to the high relative humidity and low temperature maintained in the chamber and results in progressive utilization of soluble fraction as respiratory substrate.

Application of GA_3 10 ppm under all condition of storage resulted in better retention of TSS. This was due to the increased inhibitory effect of the GA_3 on enzymes responsible for degradation of soluble fraction. Borase *et al.,* (2004) in papaya recorded decrease in TSS with increase in days of storage with GA_3 treatment.

There was a gradual decline in the titrable acidity with the increase in the storage period under two conditions of storage in all the treatments. The titrable acidity ranged from 0.03 with control to 0.07 with GA_3 10 ppm at room temperature and 0.04 with control to 0.08 with GA_3 10 ppm at cold storage. The decrease in titrable acidity with increase in storage period in all the treatments could be due to the utilization of acids in the respiratory process. The temperature had a profound effect on the acidity and it was observed that the acidity was higher in fruits stored in cold storage than at room temperature indicating higher metabolic activity at room temperature and lesser in cold temperature. Among different chemicals, application of GA_3 10 ppm was found to retain significantly higher acidity compared with other treatments under two conditions of storage which explains that the effectiveness of GA_3 on the slower degradation of organic acids for increased shelf life. Borase *et al.,* (2004) in papaya reported decrease in titrable acidity with increase in days of storage.

Decrease in ascorbic acid content was observed in kakrol fruits in storage at the both storage conditions but it was at lower extent in cold storage compared with cool temperature. The ascorbic acid content ranged from 15.29 with control to 19.76 with GA_3 10 ppm at room temperature and 15.99 with control to 20.91 with GA_3 10 ppm in cold storage. The decrease in ascorbic acid content might be due to the activity of the oxidizing enzymes like ascorbic acid oxidase, peroxidase and catalase which might have converted ascorbic acid to dehydro ascorbic acid. The retention of ascorbic acid in fruits was found higher at lower temperature. This might be due to the inhibition of activity of the ascorbic acid degrading enzymes. Further the GA_3 might have slowed down the activity of these enzymes and led to better retention of ascorbic acid under both the conditions of storage. Borase *et al.,* (2004) in papaya reported higher ascorbic acid content with GA_3 treatment over control in storage.

There was a gradual decline in the reducing sugars with the advancement of storage period in the kakrol fruits. The reducing sugars in kakrol fruits in room temperature ranged from 1.22 with control to 1.57 with GA_3 10 ppm. While in cold storage they ranged from 1.29 with control to 1.65 with GA_3 10 ppm. This might be due to more moisture losses and utilization of sugars for respiration.

Further the losses of sugars were highest at room temperature compared with cold storage. Borase *et al.,* (2004) in papaya reported decrease in reducing sugars with increase in storage period. Application of GA_3

10 ppm resulted in better retention of sugars during storage under two conditions of storage. It might be due to the lower rate of respiration and lower enzymatic activity which might have resulted in slower utilization of sugars for the respiration.

With the increase in the storage period, the organoleptic score in all the treatments decreased under two conditions of storage irrespective of treatments. The organoleptic score ranged from 5.11 with control to 7.88 with GA_3 10 ppm at room temperature, while it ranged from 1.22 with control to 1.57 with GA_3 10 ppm in cold storage indicating the sensitiveness of the fruits to storage.

The highest organoleptic score was observed in fruits treated with GA_3 10 ppm in terms of appearance and taste as compared to all other treatments at both the storage conditions. However, the score was higher with fruits stored in cold storage. This could be due to better retention of quality parameters like TSS, ascorbic acid content, reducing sugars and titrable acidity both at GA_3 10 ppm and cold storage.

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