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RESEARCH PAPER

Effect of pre-harvest foliar application of potassium sulphate on storability of ber (*Ziziphus mauritiana* Lamk.)

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Abstract : An experiment was conducted to study the effect of potassium sulphate (0.5%, 1%and 1.5%) sprayed at fruit set and one month after fruit set. Various concentration of potassium sulphate was applied through spray and fruits were harvested after maturity. Uniform size fruits were packed in card board boxes without paper lining and cushioning material and stored at room temperature. Physiological loss in weight increased with increase in storage period in all the treatments up to 8th days. Maximum PLW(Physiological loss in weight) was observed in control fruits after 8th day of storage and minimum PLW was observed in fruits sprayed with 1 per cent potassium sulphate at one month after fruit set.

Key Words : Ber, Potassium sulphate, Decay, PLW

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INTRODUCTION

Indian jujube (*Ziziphus mauritiana* Lamk.) popularly known as ber, is a member of Rhamanaceae family and is an ancient fruit of indo-China region. It is cultivated extensively in arid and semi-arid region of India. The fruits start ripening as early as middle of December in western part of India whereas in the northern plains the fruits start ripening by mid-February. Being a non-climacteric fruit, ber normally harvested at full ripening. Ripening fruits are highly perishable due to thin and delicate skin and high water content in pulp, which reduces the self life of fruit after harvest. Due to rapid change in colour and poor keeping quality, it is very difficult to transport the fruits even from the site of production to the market. According to Singh *et al.* (1973), ber is found growing under varying climatic conditions, almost throughout india. Under normal storage conditions ber fruits can not be transported to far off places. Singh and Ahlawat (1996) reported that foliar application of zinc sulphate and ureas in ber improve the fruit set and quality. Nutrients plays an important role in improving the quality of fruit and plays an important role in photosynthesis and building of the carbohydrates in the plants and finally more assimilate available for fruit development and better storage.

MATERIALS AND METHODS

The present investigation was carried out in experimental orchard and in the post-harvest technology laboratory of Department of Horticulture, C.C.S. Haryana Agricultural University, Hisar during the year 2007 and 2008. For pre-harvest treatments the healthy ber fruit plants of uniform age cv. Umran were selected and sprayed with different concentrations of potassium sulphate *i.e.* T_1 (0.5% K_2SO_4 sprayed at fruit set *i.e.* October), T_2 (0.5% K_2SO_4 sprayed at one month after fruit set *i.e.* November), T_3 (0.5% K_2SO_4 sprayed at fruit set and one month after fruit set *i.e.* October-November), T_4 (1.0% K_2SO_4 sprayed at fruit set *i.e.* October), T_5 (1.0% K_2SO_4 sprayed at one month after fruit set *i.e.* November), T_6 (1.0% K_2SO_4 sprayed at fruit set and one month after fruit set *i.e.* October-November), T_7 (1.5% K_2SO_4 sprayed at fruit set *i.e.* October), T_8 (1.5% K_2SO_4 sprayed at one month after fruit set *i.e.*

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November), T_9 (1.5% K_2SO_4 sprayed at fruit set and one month after fruit set *i.e.* October-November) and T_{10} (water spray only) as foliar application at fruit set. The fruit were harvested from sprayed plants and uniform size, free from any injury, disease or bruising were stored in cardboard boxes. Each treatment comprised of four replications with two kilogram of fruits per replication packed in each cardboard boxes. Fruit after packing in cardboard boxes were kept at room temperature for analysis of physiological loss in weight (%) and decay loss (%) after 2, 4, 6 and 8 days intervals.

Keeping in view, the present study, different concentrations of potassium sulphate applied at different stages has been tried to improve the quality and storability of ber.

RESULTS AND DISCUSSION

The experimental findings obtained from the present study have been discussed in following heads:

Physiological loss in weight (PLW) :

The data on the physiological loss in weight among different treatments have been presented in Table 1. It is clear from the data that on the 2nd day of the storage minimum PLW (Physiological loss in weight) was recorded in fruits of treatment T_6. This was at par with all the treatments except T_{10}. On the 4th day of storage minimum PLW was recorded in T_6 and maximum PLW was recorded in T_{10} (control). On the 6th day of storage minimum PLW was also recorded in T_6 and maximum PLW recorded in T_{10} (control). On the last day of storage *i.e.* 8th day of storage fruits stored in treatment T_6 had minimum PLW. However, T_{10} had maximum PLW followed by T_1. On the overall mean basis irrespective of concentration the minimum PLW was recorded in T_6 and maximum PLW was recorded in T_{10} during 2007 and 2008. Naik and Rokhade (1996) find out the effect of polyethylene packing for the storage of different cultivars of ber and observed highest weight loss in cv. Gola followed by Jogia and Mundia and least in cv. Umran followed by Sanaur-6 at room temperature. PLW in Umran was maximum (17.48%) and minimum was in Kadaka (17.35%) at 12 day of storage under ambient condition (12.26 to 30.88^{0}C, RH 34.74 to 78.90%) reported by Panpatill *et al.* (2000).

Decay loss :

The data presented in Table 2 indicated that decay loss increased during different storage period. The decay loss increased continuously up to 8th day of the storage. On the 2nd day of storage minimum decay loss was recorded in T_6 and maximum decay loss was recorded in T_{10}, T_3, T_4, T_5, T_7, T_8 and T_9 were at par during both the year of experimentation. On the 4th day of storage the minimum decay loss was recorded in T6 and maximum decay loss was recorded in T_{10} and T_4, T_5, and T_9 was found significantly at par. On the 6th day of storage T_6 observed minimum decay loss. The T_3, T_5, T_7, T_8 and fruits of treatment T_9 were at par with each other. At the end of storage (8th day) the minimum decay loss was recorded in T_6 and maximum decay loss was recorded in T_{10}. On the mean basis irrespective of concentration the minimum decay loss was recorded in T_4, T_5 and T_6 and maximum decay loss was recorded in T_{10}. Jawanda *et al.* (1980) reported that there were no spoilage in Umran fruits upto 10 days and 20 days in Sanaur-2 when stored at a temperature 0-3.3^{0}C and relative humidity 85-90 per cent. Banik *et al.* (1998) also reported that the ber fruits may be stored well for upto 18th day at low temperature with minimum spoilage.

Decay organisms :

Among various micro-organism isolated from decayed fruits indicated that *Alternaria* sp., *Fusarium* sp. and *Aspergillus* sp. were found in predominance which was responsible for spoilage (Table 3). This might be due to

Table1: Effect of pre-harvest foliar application of potassium sulphate on physiological loss in weight (%) during storage of ber fruit cv. UMRAN

Treatments	Days							
	2		4		6		8	
	2007	2008	2007	2008	2007	2008	2007	2008
T_1	2.66	2.80	6.90	7.94	10.13	12.35	18.46	18.70
T_2	2.46	2.70	6.40	7.80	10.00	12.40	16.93	18.38
T_3	2.40	2.66	5.93	7.80	9.13	12.20	16.90	18.00
T_4	2.52	2.49	6.06	7.20	9.33	11.90	16.23	16.60
T_5	2.20	2.32	5.28	6.53	8.46	10.55	15.33	15.30
T_6	2.16	2.25	5.26	6.50	6.29	10.52	15.26	15.20
T_7	2.56	2.70	5.80	7.50	9.60	12.20	17.21	17.98
T_8	2.40	2.66	5.90	7.30	8.77	12.00	16.33	16.86
T_9	2.30	2.50	5.38	6.79	8.60	11.53	16.13	16.40
T_{10}	3.66	4.50	7.00	9.57	10.53	16.38	19.33	24.60
C.D. at 5%	0.67	0.28	0.83	0.70	0.91	1.40	0.98	1.24

presence of various sugars and acid in ber and environmental conditions prevailing during the storage period. But the degree of incidence was lower in T_6 and maximum degree of incidence was recorded in T_{10}. Singh and Gupta (1983) reported that better performance of gunny bags and wooden boxes with regard to spoilage reduction in storage of Kaithli and Umran ber. Further they found that proper paper cutting is the best cushioning material for reduction of decay loss due to *Ulociadium chartarum, Phoma hissarrenses.* Sudhir *et al.* (2005) reported that form the 6th day of storage, the incidence

Table 2: Effect of pre-harvest foliar application of potassium sulphate on decay loss (%) during storage of ber fruits cv. UMRAN

Treatments	Days							
	2		4		6		8	
	2007	2008	2007	2008	2007	2008	2007	2008
T_1	2.40	2.60	3.33	3.96	7.20	8.60	13.63	14.80
T_2	2.30	2.50	3.29	3.80	7.33	8.25	13.33	14.60
T_3	2.26	2.43	3.28	3.76	7.10	8.20	13.23	14.42
T_4	2.28	2.36	3.15	3.50	7.33	8.10	13.10	14.20
T_5	2.10	2.20	3.10	3.30	7.00	7.60	13.00	14.00
T_6	2.07	2.16	2.80	3.22	6.47	7.50	12.09	13.52
T_7	2.39	2.40	3.36	3.56	7.10	8.43	13.93	14.48
T_8	2.14	2.33	3.23	3.58	7.03	8.22	13.30	14.42
T_9	2.10	2.30	3.20	3.40	7.00	8.12	13.10	14.23
T_{10}	3.80	2.80	6.88	4.71	13.63	14.71	17.11	19.21
C.D. at 5%	0.28	0.31	0.40	0.30	0.53	0.70	1.10	0.90

Table 3: Effect of pre harvest foliar application of potassium sulphate on occurrence of pathogen during storage of ber cv. UMRAN (2007-08)

Treatments	Days of storage			
	2	4	6	8
T_1	-	-	*Fusarium* spp.	*Fusarium* spp.
			Alternaria spp	*Alternaria* spp.
T_2	-	-	-	*Fusarium* spp.
				Alternaria spp.
T_3	-	-	-	*Fusarium* spp.
				Alternaria spp.
T_4	-	-	-	*Fusarium* spp.
				Alternaria spp.
T_5	-	-	-	*Fusarium* spp.
				Alternaria spp.
T_6	-	-	-	*Fusarium* spp.
				Alternaria spp.
T_7	-	-	-	*Fusarium* spp.
				Alternaria spp.
T_8	-	-	-	*Fusarium* spp.
				Alternaria spp.
T_9	-	-	-	*Fusarium* spp.
				Alternaria spp.
T_{10}	-	-	*Fusarium* spp.	*Fusarium* spp.
			Aspergillus niger	*Aspergillus niger*
			Alternaria spp.	*Alternaria* spp.

of *Penicillium expansum, Aspergillus niger* and *Rhizoctonia stolonifer* increased with storage period, particularly under polythene bags, plastic bags and wooden boxes.

Conclusion :

All the treatments were effective to reduce the PLW during storage period. Fruits treated with per cent potassium sulphate spray at fruit set and one month after fruit set observed minimum decay loss.

REFERENCES

Banik, D., Hore, J.K. and Sen, S.K. (1998). Studies on storage life of ber (*Ziziphus mauritiana* Lamk.). *Haryana J. Hort. Sci*., **17** (1-2): 49-55.

Jawanda, J.S., Bal, J.S., Joshan, J.S. and Mann, S.S. (1980). Studies on the storage of ber fruits I. Room temperature. *Punjab Hort. J*., **20** (1-2): 56-61.

Naik, K.R. and Rokhade, A.K. (1996). Effect of polythene packaging on the storage different ber cultivars. Karnataka. *J. Agric. Sci.*, **9** (1): 85-88.

Panpatill, N.V., Mujjal, S.V., Patil, S.R. and Damanme, S.V. (2000). Effect of post harvest applications of calcium salt on physico-chemical parameters and shelf life of ber (*Zizhiphus mauritiana* Lamk.) fruits at ambient storage. *Orissa J. Hort.,* **28** (1) : 25-30.

Singh, J.P. and Gupta, O.P. (1983). Evaluation of various packages for ber fruits in relatione to decay loss caused by various microbs. *HAU J. Res*., **13** (4): 593-595.

Singh, K.K., Chandha, K.L. and Gupta, M.R. (1973). Punjab Agricultural University, Ludhaina (PUNJAB) INDIA. Leaflet, 23pp.

Singh, S. and Ahlawat, V.P. (1996). Effect of foliar spray of urea and zinc sulphate on yield parameters of ber (*Ziziphus mauritiana* Lamk.) cv. UMRAN. *Haryana J. Hort. Sci.,* **25** (2):33-35.

Sudhir, Y., Ashwani, K. and Saini, R.S. (2005). Storage behaviour of ber transport with different packaging materials. *Haryana J. Hort. Sci*., **34** (1&2): 23-24.

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