

Short Communication

Changes in the Ripening Stage and Quality of Ber (*Ziziphus mauritiana* L.) cv. Mundia After Exogenous Application of Ethephon

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Indian jujube (*Ziziphus mauritiana* L.), commonly known as ber, is a fruit indigenous to India and China. It is a hardy tree tolerant to drought and salinity. Therefore, ber is an ideal fruit crop for the arid and semi-arid regions. Its fruit is palatable, delicious and of high nutritive value (Pareek, 1983).

Ethephon is a commercial preparation of ethylene, a ripening hormone, which has been reported effective in accelerating the ripening and enhancing the quality of ber. The response of ethephon has been found variable and depends upon its concentration, crop, time of application and temperature during ripening period (Singh *et al.*, 1981; Frey and Grienson, 1993; Gupta *et al.*, 2001). Abeles *et al.* (1992) reported its dramatic effects on plant growth and metabolic processes at as low as 1.0 ppm concentration in different crops. With this background, present investigation was undertaken to determine the optimum dose of exogenously applied ethephon on advancement of maturity and improvement in the quality of ber fruits.

Experiment was conducted during 1997-98 on ber trees planted 8.0 m apart at the research farm of the college in 1985. Manures, fertilizers, protection measures and other inputs were provided as per the recommendations for this region. Ethephon

40% a.i. (Chloroethyl phosphonic acid) of 500, 750 and 1000 ppm concentrations were applied on the plants 7 to 8 days prior to first anticipated fruit picking along with 0.1% tween 80 as wetting agent. Control plants were sprayed with distilled water. Fruits were harvested after 7, 14, 21, 28 and 35 days of spray in all the treatments. Fruits were collected at random and analyzed for total soluble solids, acidity, and reducing and non-reducing sugars at different stages (AOAC, 1990). Fruits harvested in five pickings were summed up to calculate the per cent harvest at every picking.

Results show that ethephon application significantly increased the percentage of harvestable fruits at different intervals. At 7th day of spray, maximum harvest was recorded with 1000 ppm ethephon, followed by 750 ppm. At 14th and 21st day of spray all the three concentrations showed significantly higher ripened fruits for harvesting as compared to control. Complete harvesting was reported upto 28th day of spray with 750 and 1000 ppm ethephon, whereas in other treatments ripening continued beyond this time (Table 1). It is suggested that autocatalysis of ethylene production is a characteristic feature of climacteric fruits in which a massive increase

Table 1. Effect of pre-harvest application of ethephon on, per cent harvest of ripened ber fruits cv. *Mundia* at different intervals

Ethephon	7 DAS	14 DAS	21 DAS	28 DAS	35 DAS
Control	20.32	23.47	27.62	28.22	100.0
500 ppm	20.69	57.94	80.39	92.60	100.0
750 ppm	32.46	62.66	91.81	99.91	—
1000 ppm	36.56	81.41	94.31	100.00	—
CD at 0.05 P	14.803	15.683	8.357	7.883	—

DAS: days after spray of ethephon.

in ethylene production might be triggered by exposure to ethephon (Selvraj, 1993).

Data on metabolites show that application of ethephon significantly increased the reducing and non-reducing sugars. These changes might be either due to increase in synthesis of certain sugars or by degradation of starch on account of exogenous application of ethephon (Bal *et al.*, 1993). Ethephon at 500 ppm exhibited significant response at 14th day. However, the effect of 750 and 1000 ppm ethephon continued upto 21st day after spray. It shows that ethephon was able to trigger the synthesis

ppm showed better performance at both the time of observations. Increase in TSS and reduction in acidity due to the application of ethephon showed a good sign to enhance the quality of fruits. Almost similar results have also been reported by Singh *et al.* (1981).

The present study suggests that the application of ethephon increases the per cent availability of ripened fruits at every picking. The quality of fruits in terms of TSS, sugars and acidity was also found better. Among different concentrations of ethephon 750 ppm was found most suitable.

Table 2. Effect of ethephon on some quality parameters of ber fruits cv. *Mundia*

Ethephon	Reducing sugars		Non-reducing sugars		TSS (%)		Acidity (%)	
	14 DAS	21 DAS	14 DAS	21 DAS	14 DAS	21 DAS	14 DAS	21 DAS
Control	6.21	7.81	2.45	2.87	16.24	18.00	0.28	0.27
500 ppm	7.18	8.02	1.99	3.12	18.11	20.50	0.26	0.23
750 ppm	7.07	8.70	3.12	3.31	20.44	20.18	0.24	0.20
1000 ppm	7.41	8.89	3.03	3.59	18.78	19.76	0.24	0.21
CD at 0.05 P	0.26	0.81	0.46	0.34	1.74	1.08	0.03	0.04

DAS: days after spray of ethephon.

of sugars even at low concentration (Table 2).

Total soluble solids increased and per cent acidity decreased at all the concentrations of ethephon. Among the treatments, 750

Acknowledgements

The authors are thankful to the Head, Department of Horticulture, SKN College of Agriculture, Jobner, for providing necessary facilities and guidance.

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