HOT ETHREL IMPROVES THE PEEL COLOUR DEVELOPMENT OF 'KARUTHACOLOMBAN' MANGO

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Among the mango cultivars available in Sri Lanka, 'Karuthacolomban' shows poor peel colour development during natural ripening. Lack of attractive peel colour may badly affect on consumer preference. Therefore, induction of ripening for better quality of mango is of significance. Ethylene is the major determinant of the on set and rate of ripening of climacteric fruits. Even though purified ethylene can be used for ripening induction, it becomes uneconomical due to high cost of imported purified ethylene. Therefore, commercially available ethrel can effectively be used as an alternative. The most important diseases responsible for post harvest losses during ripening are anthracnose and stem-end rot. Hot water treatment is widely used for disinfection of mango against post harvest diseases (Jacobi and Wong, 1992). By using hot ethrel, the time taken for ripening can be reduced. As a consequence, the post harvest disease development can also be controlled. Studies were therefore conducted to find out the suitable temperature for hot ethrel treatment when ethrel is used as 1ml/l of water and to study the physico-chemical parameters of ripened fruits.

MATERIALS AND METHOD

Effect of hot ethrel on ripening induction of 'Karuthacolomban' mango

Fully mature green 'Karuhtacolomban' mangoes were handpicked from mango orchard in Dambulla and carefully transported to the laboratory of the Food Research Unit using plastic crates. Stem of all fruits were detached and latex was removed. Fruits were divided into four groups having 12 fruits per group. Five ml of ethrel was added to 5 L of water. One group of mango was dipped in ethrel solution for 3-4 minutes and treated fruits were taken

out. Ethrel solution was then heated to 48^0 C. The second group of mango was put in a net bag and was dipped in that solution for 3-4 minutes. After taking the treated fruits out, the Ethrel solution was again heated to 52^0 C and the third group of fruits was dipped for 3-4 minutes. The remaining group of fruits was served as untreated control. All Ethral treated fruits and untreated fruits were placed in four plastic bins separately and the bins were sealed for 24hrs. Bins were then opened and allowed for sufficient ventilation until fruits are ripe.

Time taken to reach table-ripe stage was recorded and all the measurements were taken at that stage. Percentage weight loss, total soluble solid (TSS) and titratable acidity were measured. Peel colour was visually observed using a colour index. Fruits were evaluated for disease development using disease index and visual quality of fruits was evaluated following the numerical index. Sensory evaluation for odour, flavour and overall acceptability was recorded using the Hedonic scale having six numbered trained taste panel.

RESULTS AND DISCUSSION

Ethrel treated fruits at 26^0 C and control fruits reached table ripe stage around 11 days (Table 1). Due to long time period taken for ripening significantly higher percentage of weight loss was recorded. However, fruits treated with ethrel at 48^{0}C reached table ripe stage around 8 days after the treatment. Therefore, percentage weight loss was significantly lowered by 3% as shown in Table 1. The minimum time duration around 6 days was taken to reach table ripe stage of fruits treated at 52^0 C. Hence 52^0 C ethrel treatment was significantly decrease the time taken for ripening. TSS of mango at table ripe stage was unaffected by dipping in ethrel solution at 26^0 C, 48^0 C and 52^0 C.

Table 1. **Means of time taken to reach table ripe stage, percentage weight loss, TSS and medians of colour index of 'Karuthacolomban' mango as affected by ethrel treatment**

Treatment	Time taken for Ripening	% weight loss	TSS	Colour Index
Control	11.26a	10.83a	12.12a	2.9
Ethrel 26°C	11.09a	10.41a	11.96a	3.0
Ethrel 48°C	8.29b	8.53b	10.70a	4.5
Ethrel 52°C	6.35c	7.42c	12.01a	5.0

Treatment means in a column having common letters are not significantly different by DMRT (P=0.05)

Medians of colour index of ethrel treated fruits are significantly different by Kruskal-Wallis Test (P=0.05)

Colour index: 1 - Green, 2 - Colour break, 3 - More green than yellow, 4 - More yellow than green, 5 - Full yellow, 6 - Yellow with brown patches

Ethrel treatment at 26° C, 48° C and 52° C was significantly affected on peel colour development. Significantly higher peel colour index was recorded for 52°C ethrel treatment where as significantly lower value was recorded for 26°C ethrel treated and control fruits. Therefore, 52° C ethrel treatment progressively upsurges the peel pigmentation by accelerating carotinoid synthesis and chlorophyll degradation. No significant difference in sensory parameters tested showed that the induction temperature was not impaired the eating quality of the fruit.

Ethrel treatments at different temperatures were significantly affected on visual quality rating (VQR) and disease index of fruits (Table 2).

Table 2. Medians of visual quality rating and disease index of 'Karuthacolomban'mango at table ripe stage as affected by ethrel treatment

Treatment	Visual Quality Rating	Disease Index
Control	4.0	1.8
Ethrel 26^{0}C	4.0	2.0
Ethrel 48^{0}C	2.5	3.0
Ethrel 52^{0}C	7.0	0.5

Medians of ethrel treated fruits are significantly different by Kruskal-Wallis Test (P=0.05)

VQR : 1=Non edible for most discolouration and shriveling, 3 - Moderately edible up to 30% surface affected, 5-Fair defects moderate defects, 7 - Good slight defects, 9 - Excellent

Disease index : 0 = No disease, 1 = 1-10% disease, 2 = 11-20% disease, 3 = 21-30% disease, 4 = More than 30% disease

Visual quality rating was remained similar in fruits treated with ethrel at 26^0 C and control. Significantly higher VQR was recorded in 52^0 C ethrel treated fruits where as very much lower scores was recorded for 48^0 C ethrel treated fruits. Higher VQR was recorded due to lesser disease severity in those fruits. However, anthracnose was effectively controlled by hot ethrel treatment. Therefore, reduction of visual quality was mainly due to stem-end rot. Johnson *et al.* (1992) reported that stem-end rot emerged as a problem when anthracnose is well controlled by pre and post harvest treatment. Higher disease incidence of mangoes treated with 48^0 C ethrel, may be due to acceleration of growth of dormant fungi. When mangoes are treated with ethrel at 48^{0}C, the temperature may facilitate the breaking of dormancy hence early growth of pathogen could be observed.

CONCLUSION

Hot ethrel treatment at 52^0 C successfully enhances the peel colour development and improves the fruit quality by controlling post harvest diseases. Anthracnose was effectively controlled by treating fruits with ethrel at 48^{0}C

and 52°C. Hot ethrel treatment at 52° C successfully reduced the time taken for table ripe stage down to 6 days. High temperature used for induction did not impair the eating quality of mango. However, further studies are needed to study the behaviour of post harvest diseases.

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