



P-ISSN: 2349-8528
E-ISSN: 2321-4902
IJCS 2018; 6(3): 29-31
© 2018 IJCS
Received: 19-03-2018
Accepted: 21-04-2018

Dipika Thorat

Department of Fruit Science,
ASPEE College of Horticulture
and Forestry, Navsari
Agricultural University, Navsari,
Gujarat, India

Tandel YN

Department of Fruit Science,
ASPEE College of Horticulture
and Forestry, Navsari
Agricultural University, Navsari,
Gujarat, India

Thakriya HR

Department of Fruit Science,
ASPEE College of Horticulture
and Forestry, Navsari
Agricultural University, Navsari,
Gujarat, India

Correspondence

Dipika Thorat

Department of Fruit Science,
ASPEE College of Horticulture
and Forestry, Navsari
Agricultural University, Navsari,
Gujarat, India

International Journal of Chemical Studies

Effect of antitranspirants on growth and survival of epicotyl grafts of mango (*Mangifera indica* L.) cv. kesar

Dipika Thorat, Tandel YN and Thakriya HR

Abstract

The present experiment entitled Effect of antitranspirants on growth and survival of epicotyl grafts of (*Mangifera indica* L.) cv. Kesar was conducted during 2014-2015 at Regional Horticultural Research Station, Navsari Agricultural University, Navsari. The experiment was laid out in Completely Randomized Design with three replications and ten treatments viz., ABA 500 mg.l⁻¹ (T₁), ABA 1000 mg.l⁻¹ (T₂), PMA 150 mg.l⁻¹ (T₃), PMA 300 mg.l⁻¹ (T₄), Salicylic acid 500 mg.l⁻¹ (T₅), Salicylic acid 1000 mg.l⁻¹ (T₆), Kaolin 2.5 % (T₇), Kaolin 5 % (T₈) and control i.e. water spray (T₉) and no water spray (T₁₀). The experimental results revealed that the maximum growth of grafts in terms of height of grafts, relative water content minimum physiological parameters in terms of transpiration rate and photosynthesis rate were recorded in spray treatment of Kaolin (2.5 and 5 %). Consequently, the maximum survival grafts was also registered in the same treatments.

Keywords: Mango, antitranspirants, physiological parameters, survival

Introduction

Mango (*Mangifera indica* L.) is one of the major fruits of Asia, which belongs to the family Anacardiaceae and originated from Indo-Burma region. It has developed its own importance all over the world. Being a useful and delicious fruit, it is a part of culture and religion since the time immemorial. Besides, the taste and good quality, it is called as 'The King of Fruits', and also known as a national fruit of India. It is grown almost all part of the world and occupies a unique place amongst the rest of the fruit crops grown in India.

There have been hundreds of studies on the use of antitranspirants to reduce transpiration of crops in the open field under semi arid conditions. Common purpose was saving the limited amount of available water, reduction of drought stress and consequently improved crop production. There are groups of antitranspirants viz., reflecting, film forming and closing (Marcelis *et. al.*, 2008). Reflecting type of antitranspirants substances (Kaolin) that reflect the light when applied on leaves. Reflecting substances seems not interesting for greenhouse production as they lead to a loss of light on the leaves and consequently it leads to reduction in photosynthesis. Film forming type of antitranspirants substances (vapour guard, film forming polymers) that form a film on the leaf (on the stomata) and therefore reduce gas diffusion. Closing type of antitranspirants substances (abscisic acid, acetyl salicylic acid) that lead to a (partial) closure of stomata. antitranspirants are the materials or chemicals which decrease the water loss from plant leaves by reducing the size and number of stomata. Nearly 99 per cent of the water absorbed by the plant is lost in transpiration.

Materials and Methods

An experiment was conducted at the Regional Horticultural Research Station, Navsari Agricultural University, Navsari to find out effect of antitranspirants on growth and survival of epicotyl grafts of mango (*Mangifera indica* L.) cv. Kesar. Geographically Navsari is situated at 20°57' N latitude and 72°54' E longitude and at the elevation of 10 meter above mean sea level. The Regional Horticultural Research Station is about 11 kilometers away in the East from Arabian sea shore and the historical place Dandi famous for Salt Satyagrah in Indian freedom history. The maximum temperature rises to 42° C in the month of April and May while minimum temperature recorded 10 °C in the month of January. Annual rainfall is about 1500 to 1800 mm.

1. Height of graft (cm)
Height was measured from the base to tip of the grafts.
2. Relative water content (%)

$$\text{RWC} (\%) = \frac{\text{FW}(\text{Sample fresh weight}) - \text{DW}(\text{Sample dry weight})}{\text{TW}(\text{Turgid weight}) - \text{DW}(\text{Sample dry weight})} \times 100$$

3. Physiological parameter

Transpiration rate (mmol/m²/s), photosynthetic rate (μmol/m²/s) were measured by using CI-340 hand held photosynthesis system. These parameters were recorded on 5th, 10th, 15th, 20th, 25th and 30th day of spray.

4. Survival (%)

The per cent survival of grafts was calculated as per following formula.

$$\text{Survival} (\%) = \frac{\text{No. of grafts survived}}{\text{Total no. of graft prepared}} \times 100$$

Results and Discussion

1. Height of graft (cm): From the table 1, the maximum height of graft (24.71 and 26.78 cm, respectively) was obtained with spray of Kaolin 2.5 % (T7) at 60 and 120 days after spray. However, it was at par with Kaolin 5 % (T8), Salicylic acid 500 mg/l (T5), Salicylic acid 1000 mg/l (T6). Rest of treatments (T3, T1, T2 and T4) had also significantly higher height of graft over control. At 180 days after spray, the best results on height of grafts (28.89 cm) was also recorded in spray of Kaolin 2.5 % (T7). It was statistically at par with Kaolin 5 % (T8) and Salicylic acid 500 mg/l (T5). The minimum height of grafts was recorded in control i.e. without spraying (T10) at all periodical observations (21.27, 22.12, 23.09 cm, respectively) during study.
2. Relative water content (%): From the table 1, At 60 and 120 days after treatment, the maximum relative water content (98.13 % and 98.23 %, respectively) was

obtained in treatment T7 (Kaolin 2.5 %) which was at par with T8 (Kaolin 5 %), T5 (Salicylic acid 500 mg/l), T6 (Salicylic acid 1000 mg/l). Whereas the minimum relative water content of mango grafts was noted in control treatment (T10).

Similarly, the maximum relative water content of grafts (98.70) was recorded in the treatment Kaolin 2.5 % (T7) at 180 days after spray. However, it was at par with T8 (Kaolin 5 %) and T5 (Salicylic acid 500 mg/l). The minimum relative water content of graft was noted in control i.e. without spray (T10).

3. Transpiration rate (mmol/m²/s): From the table 2, The minimum transpiration rate was found in Kaolin 2.5 % (T7) at 5 and 10 day after spraying which was statistically at par with T8 (Kaolin 5 %). While, the maximum transpiration rate of grafts was observed in control i.e. The The minimum transpiration rate was found in kaolin 2.5% (T7) at 5 and 10 days after spraying which was statistically at par with T8 (Kaolin 5 %). While, the maximum transpiration rate of grafts was observed in control i.e without spray (T10). At rest of the intervals, transpiration rate was found non-significant, however the treatment T7 (Kaolin 2.5 %) recorded the lowest transpiration rate in mango grafts in compare to other treatments including control treatment.
4. Photosynthesis rate (μmol/m²/s): From the table 3, The spray of different antitranspirants had non-significant effect on photosynthesis rate of mango grafts at 5, 10, 15, 20, 25 and 30 days after spray. However, higher photosynthetic rate was recorded in those grafts subjected to treat with 2.5 % Kaolin (T7) as compared to other treatments.
5. Survival percentage: Significantly the maximum survival percentage (83.33) of grafts was noted in Kaolin 2.5 % (T7). Rest of treatments (T5, T6, T2, T1, T3 and T4.) had also significantly higher survival percentage of grafts over control (56.67) i.e. without spray (T10) at the end of experiment (Table no-4).

Table 1: Effect of antitranspirants on height, relative water content (%) and survival (%) of epicotyl grafts of mango cv. Kesar

Treatments	Height of graft(cm)			Relative water content (%)			Survival (%)
	60 Days	120 Days	180 Days	60 Days	120 Days	180 Days	
T ₁ : ABA 500 mg/l	22.12	23.18	24.57	94.83	91.20	88.05	66.67
T ₂ : ABA 1000 mg/l	22.09	23.75	24.83	91.77	90.37	91.80	68.33
T ₃ : PMA 150 mg/l	22.16	23.17	24.99	93.53	89.43	90.00	63.33
T ₄ : PMA 300 mg/l	22.08	23.08	24.52	92.10	90.80	90.37	61.67
T ₅ : Salicylic acid 500 mg/l	23.52	25.23	26.76	95.43	95.60	93.67	73.33
T ₆ : Salicylic acid 1000 mg/l	23.23	24.79	25.12	94.87	92.47	93.20	71.67
T ₇ : Kaolin 2.5 %	24.71	26.78	28.89	98.13	98.23	98.70	83.33
T ₈ : Kaolin 5 %	24.19	26.23	28.32	96.43	96.57	95.97	76.67
T ₉ : Water spray	21.30	22.17	23.10	89.60	88.71	88.38	58.33
T ₁₀ : Control (without spray)	21.27	22.12	23.09	88.40	87.07	86.07	56.67
S.Em. ±	0.70	0.76	0.77	1.22	1.99	1.78	1.66
C. D. at 5%	2.08	2.25	2.26	3.59	5.89	5.25	4.91
C. V. %	5.40	5.51	5.23	2.26	3.75	3.36	4.24

Table 2: Effect of antitranspirants on transpiration rate of epicotyl grafts of mango cv. Kesar

Treatments	Transpiration rate (mmol /m ² /s)					
	5 Days	10 Days	15 Days	20 Days	25 Days	30 Days
T ₁ : ABA 500 mg/l	0.69	0.71	0.77	0.74	0.76	0.76
T ₂ : ABA 1000 mg/l	0.67	0.72	0.77	0.76	0.77	0.76
T ₃ : PMA 150 mg/l	0.68	0.74	0.78	0.76	0.77	0.76
T ₄ : PMA 300 mg/l	0.69	0.73	0.77	0.76	0.76	0.77
T ₅ : Salicylic acid 500 mg/l	0.54	0.61	0.78	0.79	0.76	0.77

T ₆ : Salicylic acid 1000 mg/l	0.54	0.57	0.76	0.76	0.75	0.76
T ₇ : Kaolin 2.5 %	0.36	0.38	0.68	0.72	0.72	0.75
T ₈ : Kaolin 5 %	0.37	0.42	0.72	0.74	0.74	0.76
T ₉ : Water spray	0.72	0.77	0.79	0.78	0.78	0.78
T ₁₀ : Control (without spray)	0.77	0.78	0.80	0.79	0.79	0.79
S.Em. ±	0.01	0.01	0.02	0.02	0.01	0.01
C. D. at 5%	0.04	0.05	NS	NS	NS	NS
C. V. %	4.78	5.13	6.15	5.45	4.45	3.29

Table 3: Effect of antitranspirants on photosynthesis rate of epicotyl grafts of mango cv. Kesar

Treatments	Photosynthesis rate ($\mu\text{mol}/\text{m}^2/\text{s}$)					
	5 Days	10 Days	15 Days	20 Days	25 Days	30 Days
T ₁ : ABA 500 mg/l	4.10	4.09	4.07	4.15	4.02	4.17
T ₂ : ABA 1000 mg/l	4.08	4.17	4.03	4.07	4.09	4.03
T ₃ : PMA 150 mg/l	4.03	4.04	4.07	4.15	4.06	4.05
T ₄ : PMA 300 mg/l	4.06	4.08	4.03	4.13	4.15	4.07
T ₅ : Salicylic acid 500 mg/l	4.42	4.33	4.28	4.23	4.32	4.33
T ₆ : Salicylic acid 1000 mg/l	4.37	4.18	4.15	4.22	4.25	4.28
T ₇ : Kaolin 2.5 %	4.50	4.48	4.49	4.53	4.43	4.47
T ₈ : Kaolin 5 %	4.47	4.43	4.40	4.38	4.35	4.41
T ₉ : Water spray	3.97	4.00	4.00	4.08	4.00	3.80
T ₁₀ : Control (without spray)	3.51	3.61	3.54	3.75	3.60	3.59
S.Em. ±	0.19	0.18	0.18	0.18	0.18	0.18
C. D. at 5%	NS	NS	NS	NS	NS	NS
C. V. %	8.15	7.75	7.67	7.54	7.78	7.87

Acknowledgement

The authors are highly grateful to Hon'ble Vice Chancellor and Director of research, Navsari Agricultural University, Navsari for providing sanction to carry out the research work. The authors are also grateful to Principal and Dean, ASPEE College of Horticulture and Forestry, NAU, Navsari for providing necessary facilities for carrying out the research work.

References

1. Aly M, El-Megeed NA, Adward RM. Reflective particle films affected on sunburn, yield, mineral composition and fruit maturity of 'anna' apple (*Malus domestica*) trees. Res. J Agric. Biol. Sci. 2010; 6(1):84-92.
2. Anonymous. Indian horticulture database. National Horticulture Board, 2014a, 93-94.
3. Baggott AJ Jr, Joiner JN. Effects of shade, mist and antitranspirant on rooting and nutrient leaching of *Ligustrum japonicum* and *Chrysanthemum morifolium* cuttings. Florida State Hort. Soc, 1974, 474-477.
4. Davenport DC, Uriu K, Hagan RM. Cherry fruit with antitranspirant sprays. California Agric. 1972; 8:9-10.
5. El-Zeiny HA, Leila BA, Gaballah MS, Khalil S. Antitranspirant application to sesame plant for salinity stress augmentation. Res. J Agri. Bio. Sci. 2007; 3(6):950-959.
6. Gale J, Hagan RM. Plant antitranspirant. Ann. Rev. Pl. Physiol. 1966; 17:269-282.
7. Goreta S, Leskovar DI, Jifon JL. Gas exchange water status and growth of pepper seedlings exposed to transient water deficit stress are differently altered by antitranspirants. J Amer. Soc. Hort. Sci. 2007; 132(5):603-610.
8. Nagarajah S, Ratnasooriya BG. Studies with antitranspirant on tea (*Camellia sinensis* L.). Plant and soil. 1977; 48:185-197.
9. Pandey V, Singh JN. Effect of scion cultivar, dates of grafting and levels of antitranspirant on success and survival stone grafting of mango (*Mangifera indica* L.). Orissa J Hort. 2001; 29(1):79-83.

10. Reddy YTN, Khan MM. Effect of antitranspirants on growth, water relations and fruit yield of rainfed sapota. Indian. J Hort. 2000; 57(2):125-129.