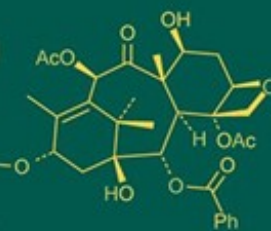
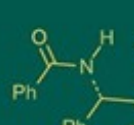
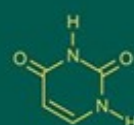


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Effect of pre-harvest foliar application of chemicals on yield attributes, firmness, and shelf life of fig (*Ficus carica* L.) cv. Phule Rajewadi

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ABSTRACT

The present investigation entitled "Effect of pre-harvest foliar application of chemicals on quality and shelf life in Fig (*Ficus carica* L.) cv. Phule Rajewadi" was conducted at the Fruit Demonstration Plot, AICRP on Arid Zone Fruits, Department of Horticulture, MPKV, Rahuri. The experiment was laid out in a Randomized Block Design (RBD) with eight treatments replicated thrice on four-year-old fig trees planted at 4.5 × 3.0 m spacing. The treatments comprised of Calcium Nitrate 1% (T₁), Calcium Nitrate 2% (T₂), Salicylic Acid 0.1% (T₃), Salicylic Acid 0.2% (T₄), Potassium Schoenite 1% (T₅), Potassium Schoenite 2% (T₆), Water Spray (T₇), and Absolute Control (T₈). The sprays were applied at 30, 60, 90, and 120 days after fruit set. Results revealed that the application of Calcium Nitrate @ 1% (T₁) recorded the maximum fruit retention (94.23%), maximum number of fruits per tree (359.33), highest average fruit weight (39.77 g) and highest total yield (14.30 kg/tree). Furthermore, (T₁) effectively extended the post-harvest shelf life up to 5.3 days under ambient conditions while maintaining a minimal physiological loss in weight (10.80% at day 5). However, maximum fruit firmness (10.70 N) was observed with Calcium Nitrate @ 2% (T₂). The minimum values across physical and yield parameters were observed in control treatments (T₇) and (T₈).

Keywords: Fig, Phule Rajewadi, Calcium nitrate, Salicylic acid, Potassium schoenite, Yield, Fruit quality, Shelf life

1. Introduction

Fig (*Ficus carica* L.) is one of the oldest cultivated fruit crops and belongs to the family Moraceae. It is an important fruit crop of subtropical and semi-arid regions and is valued for its pleasant flavour, attractive colour, high soluble solids and nutritional properties. In India, its commercial production is limited to a few places near Pune and Aurangabad districts of Maharashtra, Bellary and Anantpur districts of Karnataka (Shelke *et al.*, 2024) [1]. The crop is particularly important in the Pune region, and the Purandar fig production system has historical and commercial significance. Phule Rajewadi (JWF-6), developed by Mahatma Phule Krishi Vidyapeeth, Rahuri and released in 2015, is an improved cultivar suited to Maharashtra, producing attractive fruits with pinkish pulp and high TSS range of about 18-20 per cent. It is suitable for both Khatta and Meetha bahar and is described as moderately resistant to rust and pests (Anon., 2025) [2].

Fresh fig is highly perishable because of its high moisture content, soft texture and rapid ripening. Loss of firmness, water loss, colour changes and microbial deterioration reduce marketability after harvest. Pre-harvest nutritional management can influence fruit development before harvest and may improve physical and biochemical quality.

Fig have wide range of bioactive chemicals is largely responsible for their ability to improve health. These consist of organic acids, carotenoids, anthocyanins, phenolic acids, flavonoids, and volatile substances. Because of their antioxidant properties, polyphenols are especially significant (Nagar *et al.*, 2026) [3].

Calcium contributes to cell-wall strength through calcium pectate formation and helps maintain membrane stability (Jayachandran *et al.*, 2005) [4]. Potassium plays important roles in enzyme activation, osmotic regulation, photosynthesis, carbohydrate metabolism and translocation of assimilates (Dutta *et al.*, 2011; Gaaliche *et al.*, 2024) [5, 6]. Salicylic acid regulates several physiological and biochemical processes and has been associated with delayed ripening and reduce deterioration in fruits (Babalar *et al.*, 2007) [7]. Previous work has shown beneficial effects of calcium and potassium nutrition on fruit yield and quality in fig and other fruit crops (Jagtap *et al.*, 2012; Khodke *et al.*, 2018; Gaaliche *et al.*, 2024) [8, 9, 6]. However, information on the comparative response of Phule Rajewadi to pre-harvest foliar application of calcium nitrate, salicylic acid and potassium schoenite under Rahuri conditions is limited. Therefore, the present study was undertaken to evaluate the effect of pre-harvest foliar sprays of different chemical formulations on yield parameters, fruit firmness, and post-harvest shelf life of fig.

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2. Materials and methods

The experiment was conducted during 2023–2024 at the Fruit Demonstration Plot, All India Coordinated Research Project (AICRP) on Arid Zone Fruits, Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri. The trial was executed on a well-established four-year-old orchard of fig cv. Phule Rajewadi spaced at 4.5×3.0 m.

The experiment consisted of eight treatments arranged in a Randomized Block Design with three replications. The treatments were T₁: calcium nitrate 1%; T₂: calcium nitrate 2%; T₃: salicylic acid 0.1%; T₄: salicylic acid 0.2%; T₅: potassium schoenite 1%; T₆: potassium schoenite 2%; T₇: water spray; and T₈: absolute control. Treatments were applied by foliar spray at 30, 60, 90 and 120 days after fruit set.

Yield parameters including days to fruit maturity, average fruit weight (g), number of fruits per tree, and yield (kg/tree) were evaluated at harvest. Fruit retention was calculated from the number of fruits retained at harvest relative to the number of fruits set. Fruit firmness was measured using an Instron Universal Testing Instrument with an 8-mm compressive probe and expressed in Newton. For post-harvest shelf life evaluations, harvested fruits were stored under ambient room temperature conditions. Physiological loss in weight (PLW %) was recorded daily, and overall shelf life (days) was recorded based on fruit decay and acceptability thresholds. Data were subjected to statistical analysis using standard analysis of variance (ANOVA) techniques appropriate for RBD. (Panse *et al.*, 1985) [10].

3. Results and discussion

Yield and physical attributes

An appraisal of the data presented in Table 1, Table 2, and Table 3 reveals significant variations in fruit yield and physical dimensions due to pre-harvest foliar applications.

The maximum fruit retention (94.23%) was recorded under Calcium Nitrate 1% (T₁), which was significantly superior and minimum fruit retention (83.66%) was observed in Control (T₈). Maximum number of fruit per tree (359.33), average fruit weight (39.77 g), and total yield (14.30 kg/tree) were also recorded in T₁. This was statistically at par with Potassium Schoenite 2% (T₆) yielding 13.48 kg/tree and Calcium Nitrate 2% (T₂) yielding 13.31 kg/tree. The minimum num-

ber of fruits per tree (300.67), fruit weight (31.50 g), and yield (9.47 kg/tree) was recorded in Absolute Control (T₈). The maximum number of days to fruit maturity (115.93 days) was recorded in T₂ (Calcium nitrate 2%), which was statistically at par with T₁ (Calcium nitrate 1%). The minimum number of days to fruit maturity (92.52 days) was recorded in T₇ (Water spray).

Improved fruit growth and yield under calcium nitrate may be associated with enhanced cell division and cell-wall development, while potassium nutrition can support assimilate production and movement to developing fruits. The response is in agreement with the positive effects of calcium and potassium nutrition reported in fig, guava, mango and other fruit crops (Khodke *et al.*, 2018) [9]. The physiological function of calcium in controlling fruit ripening and senescence may be the cause of the fruit maturity delay seen under calcium nitrate therapy (Kulkarni *et al.* (2012) [11].

The present findings are in agreement with earlier reports of improved yield and fruit quality following mineral nutrition in fig and other fruit crops (Jagtap *et al.*, 2012; Khodke *et al.*, 2018; Gaaliche *et al.*, 2024; Poojan *et al.*, 2020) [8, 9, 6, 12].

Fruit firmness, PLW, and post-harvest shelf life

Data pertaining to fruit firmness, PLW, and shelf life are presented in Table 1 and Table 3.

Fruit firmness at harvest was significantly highest in Calcium Nitrate 2% (T₂, 10.70 N), followed by Calcium Nitrate 1% (T₁, 8.92 N), whereas minimum firmness was observed in Water Spray (T₇, 6.70 N). Calcium-mediated stabilization of cell-wall and membrane components provides a plausible physiological explanation for this association, consistent with the calcium-related postharvest observations reported in (Jayachandran *et al.*, 2005) [4].

In storage under ambient conditions, fruits treated with Calcium Nitrate 1% (T₁) exhibited the longest shelf life of 5.3 days with a cumulative PLW of 10.80% at day 5. Calcium Nitrate 2% (T₂) recorded a shelf life of 4.8 days with 11.20% PLW. Conversely, untreated controls (T₇ and T₈) exhibited rapid weight loss (8.40% by day 3) and lost marketability within 3.1 to 3.4 days. Reduced PLW in PLW under calcium nitrate treatments suggests better maintenance of tissue integrity and reduced moisture loss (Kumar *et al.*, 2021). Similar reductions in physiological loss in weight following pre-harvest calcium application have been reported in guava and other fruit crops (Jayachandran *et al.*, 2005; Kumar *et al.*, 2021) [4].

Table 1. Effect of pre-harvest foliar application of chemicals on fruit retention, day to fruit maturity, and firmness of fig cv. Phule Rajewadi.

Treatment	Fruit retention (%)	Days to fruit maturity	Fruit firmness (N)
T ₁	94.23	112.67	8.92
T ₂	93.09	115.93	10.70
T ₃	88.90	107.33	8.30
T ₄	90.34	102.33	8.51
T ₅	91.40	100.67	7.71
T ₆	92.92	104.45	8.01
T ₇	86.81	92.52	6.70
T ₈	83.66	96.35	7.40
Mean	90.17	104.03	8.28
SE(m)(±)	2.13	4.35	0.24
CD at 5%	6.46	12.12	0.73

Table 2. Effect of pre-harvest foliar application of chemicals on yield parameters of fig cv. Phule Rajewadi

Treatment	Fruit weight (g)	No. Fruits/tree	Yield (kg/tree)
T ₁	39.77	359.33	14.30
T ₂	38.33	347.33	13.31
T ₃	36.23	320.68	11.61
T ₄	37.60	327.63	12.31

(continued on next page)

Treatment	Fruit weight (g)	No. Fruits/tree	Yield (kg/tree)
T ₅	38.53	338.00	13.02
T ₆	39.10	344.00	13.48
T ₇	32.80	310.37	10.18
T ₈	31.50	300.67	9.47
Mean	36.74	331.00	12.21
SE(m)(±)	1.52	10.13	0.553
CD at 5%	2.10	30.75	1.68

Table 3. Effect of pre-harvest foliar application of chemicals on Physiological Loss in Weight (PLW %) and Shelf Life of fig cv. Phule Rajewadi.

Treatment	Shelf life (days)	PLW(%)				
		Day 1 (%)	Day 2 (%)	Day 3 (%)	Day 4 (%)	Day 5 (%)
T ₁	5.3	2.10	3.70	6.00	8.30	10.80
T ₂	4.8	2.20	4.00	6.30	8.70	11.20*
T ₃	3.9	3.60	7.80	11.80*	-	-
T ₄	3.7	3.90	8.10	12.00*	-	-
T ₅	4.1	2.70	5.60	8.60	11.80*	-
T ₆	4.4	2.50	5.30	8.40	11.60*	-
T ₇	3.4	3.80	7.90	12.20*	-	-
T ₈	3.1	4.10	8.40	12.40*	-	-
Mean	4.06	3.11	6.35	9.71	10.10	11.00
SE(m)(±)	0.071	0.058	0.112	0.165	0.181	0.191
CD at 5%	0.22	0.17	0.34	0.50	0.63	1.16

*storage period terminated

Conclusion

From the present investigation, it can be concluded that four pre-harvest foliar sprays of Calcium Nitrate @ 1% (T₁) applied at 30, 60, 90, and 120 days after fruit set significantly improve yield and storage parameters of fig cv. Phule Rajewadi. This treatment achieved maximum fruit retention (94.23%), higher fruit weight (39.77 g), maximum yield (14.30 kg/tree), lowest physiological loss in weight during ambient storage, and extended shelf life up to 5.3 days. For maximizing fruit firmness at harvest, pre-harvest spray of Calcium Nitrate @ 2% (T₂) was found to be superior.

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