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Influence of post-monsoon foliar application of various nutrients on days to harvest, fruit yield and physical characteristics in mango cv. Ratna

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Abstract

The experiment was conducted at College of Horticulture, Dapoli, Maharashtra during the cropping season 2021 -22 and 2022-23 in mango (cv. Ratna) with an objective to study the effect of post monsoon foliar nutrition on assessment of flowering, yield and fruit quality in mango cv. Ratna. The experiment was laid out in Randomized Block Design with three replications and nine treatments viz; Urea 1% and 3%, Potassium nitrate 1% and 3%, Orthophosphoric acid 0.5% and 1%, Monopotassium phosphate 1% and 3% and control (No spray). Potassium nitrate (KNO₃) 3% (T₅) recorded significantly minimum number of days required for harvesting from flowering (116.84 days), KNO₃ 3% (T₅) recorded significantly minimum number of days required for harvesting from fruit set (101.63 days), Urea 3% (T₃) recorded significantly highest number of fruits per tree (221.78), KNO₃ 3% (T₅) recorded significantly highest fruit yield per tree (81.19 kg), KNO₃ 3% (T₅) recorded significantly highest average fruit weight (464.13 g), KNO₃ 1% (T₄) recorded significantly maximum fruit length (12.48 cm) and the significantly maximum fruit diameter (8.00 cm) was recorded in KNO₃ 3% (T₅) treatment.

Keywords: Mango, Ratna, Post-Monsoon Foliar Nutrition, KNO₃

Introduction

Mango (*Mangifera indica* L.), popularly known as the "King of Fruits," is one of the most economically important tropical fruit crops cultivated worldwide. India is the leading producer of mango, contributing a major share to global production owing to its wide genetic diversity and favourable agro-climatic conditions. Besides its economic importance, mango is highly valued for its excellent flavour, attractive appearance, pleasant aroma, and high nutritional value. Among the commercially cultivated mango cultivars, Ratna, a hybrid of Alphonso × Neelum developed at Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, has gained considerable importance in the Konkan region of Maharashtra. The cultivar combines the superior fruit quality of Alphonso and the regular bearing habit of Neelum. Ratna produces attractive medium-sized fruits with fibreless pulp, pleasant flavour, good keeping quality, and comparatively lower incidence of spongy tissue disorder, making it suitable for both fresh consumption and processing. However, maintaining consistent fruit quality under changing environmental conditions remains a major challenge, particularly in the humid tropical climate of the Konkan. The heavy monsoon rainfall, high relative humidity, and lateritic soils. Most mango orchards are located on hilly terrains and lateritic plateaus where soil depth, water-holding capacity, and nutrient availability are often limited. These conditions pose challenges for maintaining high productivity and fruit quality. In recent years, climatic abnormalities such as irregular rainfall, cyclones, early pre-monsoon showers, delayed monsoon withdrawal, and temperature fluctuations have become more common. These conditions adversely affect flowering, fruit set, fruit retention, and fruit development, resulting in considerable yield losses. The major limitations of mango cv. Ratna is its tendency for late flowering and delayed fruit maturity, the cultivar requires a relatively longer period from fruit set to maturity, approximately 130 days, such effects are more evident in mango cv. Ratna, where delayed flowering often leads to delayed fruit maturity and harvesting. Compared to many other commercial cultivars.

Foliar nutrition has emerged as an efficient and economical approach for supplying essential nutrients directly to plant tissues during critical growth stages. Compared with soil application, foliar feeding ensures rapid nutrient absorption, minimizes nutrient losses through leaching, and improves nutrient use efficiency. Among the essential macronutrients, nitrogen, phosphorus, and potassium play crucial roles in determining fruit quality. Nitrogen supports chlorophyll formation, photosynthesis, and protein synthesis; phosphorus facilitates energy transfer and metabolic activities associated with fruit growth; while potassium regulates carbohydrate metabolism, enzyme activation, osmotic balance, sugar translocation, pigment synthesis, and accumulation of soluble solids in fruits. Consequently, foliar application of these nutrients during the post-monsoon period may substantially improve the physical and biochemical quality attributes of mango fruits. Potassium nitrate (KNO_3), containing both nitrate nitrogen and potassium, has been widely recognized as an effective foliar nutrient for improving fruit development and quality in mango. Potassium enhances translocation of photosynthates from leaves to developing fruits, leading to increased fruit weight, higher pulp content, improved total soluble solids, enhanced sugar accumulation, and better colour development. Similarly, phosphorus-containing compounds contribute to energy metabolism and carbohydrate utilization during fruit development, whereas balanced nitrogen nutrition supports sustained physiological activity without excessive vegetative growth.

Nitrogen, phosphorus, and potassium are the major nutrients involved in flowering and fruit development. Nitrogen is essential for chlorophyll formation, protein synthesis, and vegetative growth. Phosphorus plays an important role in energy transfer and reproductive development, while potassium regulates enzyme activity, osmotic balance, and carbohydrate translocation, thereby improving fruit quality. Potassium nitrate (KNO_3), containing about 14 per cent nitrogen and 46 per cent potassium, is widely used in mango cultivation as both a nutrient source and a flowering inducer. It is known to stimulate nitrate reductase activity and ethylene production, which help promote flowering. Likewise, ortho-phosphoric acid (H_3PO_4) supports flowering through its role in energy transfer processes. Normally, mango flowering begins after the withdrawal of monsoon rains and the onset of dry weather during October and November. However, in mango cv. Ratna, recent climatic irregularities have frequently disturbed this flowering pattern. Higher temperatures during the post-monsoon period often encourage vegetative flushing instead of flowering. Since these vegetative shoots require additional time to mature, flowering and fruit development are delayed, ultimately affecting harvest time and market returns. Therefore, management practices that promote timely flowering and fruiting are becoming increasingly important. Besides improving flowering, foliar nutrition also contributes to better fruit retention, yield, and fruit quality. Malshe *et al.* (2022) ^[11] reported that potassium nitrate sprays significantly improved fruit retention and yield in Alphonso mango under South Konkan conditions.

Materials and Methods

The present investigation entitled “Effect of Post-Monsoon Foliar Nutrition on Assessment of Flowering and Fruit Set of Mango (*Mangifera indica* L.) cv. Ratna. The experiment was conducted during 2021-2023 at the Mother Orchard of mango (*Mangifera indica* L.) cv. Ratna, Department of Fruit Science, College of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India. The experimental orchard is located at 17°45' N latitude and 73°12' E longitude, at an

altitude of 240 m above mean sea level. The region experiences a humid tropical climate characterized by an average annual rainfall of approximately 3500 mm, mean relative humidity of about 78%, and lateritic sandy clay loam soil with a pH ranging from 5.6 to 6.5. The experiment was carried out on 30-year-old healthy and uniformly maintained mango trees of cv. Ratna planted at a spacing of 10 × 10 m. The experiment was laid out in a Randomized Block Design (RBD) consisting of nine treatments with three replications, each replication comprising two trees, resulting in a total of 54 experimental trees. The experiment consisted of nine treatments: T₁ (control), T₂ (urea 1%), T₃ (urea 3%), T₄ (potassium nitrate 1%), T₅ (potassium nitrate 3%), T₆ (ortho-phosphoric acid 0.5%), T₇ (ortho-phosphoric acid 1%), T₈ (monopotassium phosphate 1%), and T₉ (monopotassium phosphate 3%). The first foliar spray was applied after the emergence of the post-monsoon vegetative flush during October-November, followed by a second spray 15 days later. Nutrient solutions were freshly prepared on the day of application and sprayed uniformly using a power-operated sprayer. Approximately 10 L of spray solution per tree was applied according to the respective treatment. Trees under the control treatment received no foliar nutrient application.

All experimental trees were maintained under uniform orchard management practices throughout the study period following the recommended package of practices of Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth. Farmyard manure at 50 kg tree⁻¹ and the recommended fertilizer dose of 1.5 kg N, 0.5 kg P₂O₅ and 1.0 kg K₂O tree⁻¹ were applied during July in circular trenches opened at half the canopy radius. Standard intercultural operations, including weed management, orchard sanitation, plant protection measures and irrigation during fruit development, were uniformly adopted for all treatments.

Results and Discussion

Days required for harvesting from flowering

The data on days required for harvesting from flowering in mango cv. Ratna are presented in Table 1. The pooled analysis revealed that the significantly minimum number of days required for harvesting from flowering was recorded in T₅ (Potassium nitrate 3%) (116.84 days), which was followed by T₄ (Potassium nitrate 1%) (123.58 days). Treatment T₂ (Urea 1%) (143.37 days) and T₃ (Urea 3%) (143.68 days) recorded comparatively more number of days for harvesting, whereas the maximum number of days required for harvesting from flowering was recorded in T₁ (Control) (156.45 days).

The results of the present investigation indicated that post-monsoon foliar application of nutrients significantly influenced the number of days required for harvesting from flowering in mango cv. Ratna. Among different treatments, foliar application of potassium nitrate (3%) recorded minimum number of days required for harvesting compared to other treatments and control. The reduction in days required for harvesting observed under potassium nitrate treatments might be attributed to enhanced nitrogen assimilation and improved potassium-mediated translocation of carbohydrates towards developing fruits, which accelerated fruit growth and maturity. Potassium plays an important role in enzyme activation and regulation of metabolic activities associated with starch hydrolysis and sugar accumulation, thereby promoting early fruit development and advancement of maturity.

Earlier fruit maturity due to foliar application of potassium nitrate has also been reported by Rajan *et al.* (2017) ^[15] in mango, who observed that nitrate-based foliar nutrition enhanced fruit development rate and shortened crop duration. The comparatively

reduced harvesting duration observed with monopotassium phosphate (3%) treatment might be attributed to the combined role of phosphorus and potassium in energy transfer reactions and assimilate movement towards developing fruits. Adequate

phosphorus availability enhances ATP synthesis and supports rapid cell division during early fruit development, thereby advancing fruit maturity. Similar findings were reported by Shinde *et al.* (2019)^[18] in mango.

Table 1: Effect of foliar application of nutrients on days required for harvesting from flowering in mango cv. Ratna.

Treatment	Days required for harvesting from flowering		
	2021-22	2022-23	Pooled
T ₁ : Control (No spray)	156.63	156.27	156.45
T ₂ : Urea (1%)	142.47	144.27	143.37
T ₃ : Urea (3%)	140.30	147.07	143.68
T ₄ : Potassium nitrate (1%)	129.77	117.40	123.58
T ₅ : Potassium nitrate (3%)	128.80	104.87	116.84
T ₆ : Ortho-phosphoric acid (0.5%)	141.33	139.37	140.35
T ₇ : Ortho-phosphoric acid (1%)	138.70	140.40	139.55
T ₈ : Monopotassium phosphate (1%)	143.67	132.93	138.30
T ₉ : Monopotassium phosphate (3%)	135.93	123.6	129.77
Mean	139.73	134.02	136.88
S.E. $\pm$	1.58	1.32	1.17
C.D.at 5%	4.73	3.98	3.53

Days required for harvesting from fruit set

The response of mango cv. Ratna to post-monsoon foliar nutrient application with respect to duration from fruit set to harvesting is presented in Table 2.

On pooled basis, the significantly minimum duration from fruit set to harvesting was recorded in T₅ (Potassium nitrate 3%) (101.63 days) followed by T₄ (Potassium nitrate 1%) (110.90 days) and T₆ (Ortho-phosphoric acid 0.5%) (119.08 days). Treatment T₂ (Urea 1%) (127.82 days) and T₉ (Monopotassium phosphate 3%) (127.13 days) recorded comparatively higher duration, whereas the maximum number of days required for harvesting from fruit set was recorded in T₁ (Control) (139.18 days).

Post-monsoon foliar nutrient treatments markedly influenced the duration of fruit development from fruit set to harvesting in mango cv. Ratna. Among the treatments evaluated, potassium nitrate (3%) significantly reduced the time required for harvesting, indicating accelerated fruit growth and advancement of maturity. The advancement in harvesting period observed under potassium nitrate treatments might be attributed to improved nitrogen uptake efficiency and enhanced potassium-mediated carbohydrate translocation towards developing fruits, which accelerates cell division and cell enlargement during early fruit development stages. Potassium also regulates enzyme

activity associated with starch hydrolysis and conversion into soluble sugars, thereby promoting earlier physiological maturity of fruits. Earlier fruit maturity following foliar potassium nutrition has also been reported by Ngullie *et al.* (2016)^[13] in mango, who observed reduced fruit development duration due to improved assimilate partitioning towards reproductive sinks. The comparatively shorter duration observed under orthophosphoric acid (0.5%) treatment might be attributed to enhanced phosphorus availability supporting ATP-dependent metabolic activities required for rapid fruit growth and maturation. Adequate phosphorus nutrition improves energy transfer reactions and accelerates reproductive development processes. Similar findings were reported by Sharma *et al.* (2020)^[22] in mango. Moderate reduction in harvesting duration under monopotassium phosphate treatments might be due to the synergistic role of phosphorus and potassium in improving sink strength and assimilate transport efficiency during fruit development stages. Similar observations were reported by Bairwa *et al.* (2019)^[1] in mango cv. Amrapali. The comparatively longer duration recorded under control treatment might be attributed to slower fruit development due to limited availability of nutrients required for supporting metabolic activities associated with fruit enlargement and maturity. Similar delay in harvesting duration under untreated trees has been reported by Kumar and Kumar (2022)^[9] in mango.

Table 2: Effect of foliar application of nutrients on days required for harvesting from fruit set in mango cv. Ratna.

Treatment	Days required for harvesting from fruit set		
	2021-22	2022-23	Pooled
T ₁ : Control (No spray)	139.20	139.17	139.18
T ₂ : Urea (1%)	125.30	130.33	127.82
T ₃ : Urea (3%)	128.53	137.60	133.07
T ₄ : Potassium nitrate (1%)	110.13	111.67	110.90
T ₅ : Potassium nitrate (3%)	105.07	98.20	101.63
T ₆ : Ortho-phosphoric acid (0.5%)	120.03	118.13	119.08
T ₇ : Ortho-phosphoric acid (1%)	119.13	129.50	124.32
T ₈ : Monopotassium phosphate (1%)	127.17	119.43	123.30
T ₉ : Monopotassium phosphate (3%)	125.17	129.10	127.13
Mean	122.19	123.68	122.94
S.E. $\pm$	2.06	2.37	1.27
C.D.at 5%	6.18	7.11	3.83

Number of fruits per tree at harvest stage

Considerable variation among treatments was observed with

respect to number of fruits per tree at harvest stage as reflected in Table 3 and fig. 1

On pooled basis, the significantly highest number of fruits per tree was recorded in T₃ (Urea 3%) (221.78) followed by T₂ (Urea 1%) (198.97) and T₇ (Ortho-phosphoric acid 1%) (196.11). Treatment T₉ (Monopotassium phosphate 3%) (174.38), T₄ (Potassium nitrate 1%) (168.53) and T₈ (Monopotassium phosphate 1%) (163.54) recorded comparatively lower number of fruits per tree, whereas the minimum number of fruits per tree was recorded in T₁ (Control) (156.83). Post-monsoon foliar nutrient application exerted a pronounced influence on the number of fruits retained up to harvest stage in mango cv. Ratna. The significantly higher number of fruits per tree recorded under urea (3%) treatment might be attributed to improved nitrogen availability during the critical period of floral differentiation and early fruit development, which enhanced reproductive sink strength and supported better fruit retention up to harvest stage.

Nitrogen plays a key role in synthesis of amino acids, proteins and enzymes involved in reproductive growth processes and promotes development of functional leaves capable of supplying adequate assimilates to developing fruits. Enhanced assimilate supply during early fruit growth stages ultimately results in higher number of fruits retained on trees. Similar improvement in number of fruits per tree following foliar nitrogen application has been reported by Dutta *et al.* (2017) ^[6] in mango. The comparatively higher number of fruits recorded under orthophosphoric acid treatments might be attributed to improved phosphorus availability supporting energy transfer reactions and ATP synthesis required during reproductive development and fruit growth processes. Adequate phosphorus nutrition enhances sink activity and reduces premature fruit drop. Similar findings were reported by Gurjar *et al.* (2018) ^[7] in mango. Moderate increase in number of fruits per tree observed under potassium nitrate treatments might be attributed to improved carbohydrate translocation and regulation of enzymatic activities associated with fruit development. Potassium plays an important role in maintaining osmotic balance and enhancing assimilate transport towards developing fruits, thereby improving fruit retention up to harvest stage. Similar observations were reported by Bhowmick *et al.* (2020) ^[4] in mango.

Table 3: Effect of foliar application of nutrients on number of fruits per tree at harvest stage in mango cv. Ratna.

Treatment	Number of fruits per tree		
	2021-22	2022-23	Pooled
T ₁ : Control (No spray)	152.84	160.83	156.83
T ₂ : Urea (1%)	197.21	200.73	198.97
T ₃ : Urea (3%)	207.45	236.11	221.78
T ₄ : Potassium nitrate (1%)	164.23	172.83	168.53
T ₅ : Potassium nitrate (3%)	181.62	178.37	180.00
T ₆ : Ortho-phosphoric acid (0.5%)	198.50	173.06	185.78
T ₇ : Ortho-phosphoric acid (1%)	202.48	189.73	196.11
T ₈ : Monopotassium phosphate (1%)	164.25	162.83	163.54
T ₉ : Monopotassium phosphate (3%)	173.66	175.09	174.38
Mean	182.47	183.29	182.88
S.E. ±	2.52	2.03	1.48
C.D.at 5%	7.55	6.08	4.44

Fruits kg per tree

Post-monsoon foliar nutrient treatments produced marked variation in fruit yield per tree of mango cv. Ratna, as indicated by the data summarized in Table 4. And fig. 2

On pooled basis, the significantly highest fruit yield per tree was recorded in T₅ (Potassium nitrate 3%) (81.19 kg) followed by T₃ (Urea 3%) (80.12 kg) and T₆ (Ortho-phosphoric acid 0.5%) (75.46 kg). Treatment T₂ (Urea 1%) (71.52 kg) and T₉ (Monopotassium

phosphate 3%) (69.42 kg) recorded comparatively moderate fruit yield per tree, whereas the minimum fruit yield per tree was recorded in T₁ (Control) (57.69 kg).

Post-monsoon foliar nutrient application significantly influenced fruit yield per tree in mango cv. Ratna. The highest fruit yield observed under potassium nitrate (3%) treatment on pooled basis might be attributed to its cumulative positive effect on flowering behaviour, fruit set, fruit retention and advancement of fruit maturity, which ultimately contributed to higher productivity. Potassium plays a vital role in regulating photosynthetic activity, enzyme activation and assimilate transport from source leaves to developing fruits. Improved potassium nutrition enhances sink strength of fruits and reduces premature fruit drop, thereby increasing total yield per tree. Similar enhancement in yield due to foliar potassium nitrate application has been reported by Muddanesh *et al.* (2022) ^[12] in mango cv. Kesar. The comparatively higher fruit yield recorded under urea (3%) treatment might be attributed to improved nitrogen availability supporting synthesis of chlorophyll, proteins and enzymes involved in reproductive development and fruit growth. Adequate nitrogen nutrition enhances leaf area development and photosynthetic efficiency, thereby increasing assimilate supply to developing fruits. Similar findings were reported by Sarkar *et al.* (2019) ^[17] in mango.

Improved fruit yield observed under orthophosphoric acid (0.5%) treatment might be due to enhanced phosphorus availability supporting ATP-mediated metabolic activities and energy transfer processes required during flowering, fruit set and fruit development stages. Phosphorus plays an important role in strengthening reproductive sink activity and improving overall productivity of mango trees. Similar observations were reported by Kumar *et al.* (2018) ^[8] Malshe *et al.* (2022) ^[11] and Pilli *et al.* (2025) ^[14] in mango. The comparatively lower fruit yield recorded under control treatment might be attributed to absence of supplemental nutrient supply required during critical reproductive stages, resulting in reduced assimilate availability and lower fruit retention. Similar reduction in yield under untreated trees has also been reported by Beniwal *et al.* (2021) ^[12] in mango.

Table 4: Effect of foliar application of nutrients on fruits kg per tree at harvest stage in mango cv. Ratna.

Treatment	Fruits kg/tree		
	2021-22	2022-23	Pooled
T ₁ : Control (No spray)	58.13	57.24	57.69
T ₂ : Urea (1%)	66.28	76.76	71.52
T ₃ : Urea (3%)	77.81	82.44	80.12
T ₄ : Potassium nitrate (1%)	70.75	77.77	74.26
T ₅ : Potassium nitrate (3%)	75.30	87.08	81.19
T ₆ : Ortho-phosphoric acid (0.5%)	79.57	71.35	75.46
T ₇ : Ortho-phosphoric acid (1%)	76.21	73.40	74.80
T ₈ : Monopotassium phosphate (1%)	64.66	66.60	65.63
T ₉ : Monopotassium phosphate (3%)	66.50	72.34	69.42
Mean	70.58	73.89	72.23
S.E. ±	1.39	1.03	0.70
C.D.at 5%	4.16	3.09	2.10

Average fruit weight (g) at harvest stage

The data on fruit weight at harvest stage as influenced by post-monsoon foliar application of nutrients in mango cv. Ratna are presented in Table 5

On pooled basis, the significantly highest average fruit weight was recorded in T₅ (Potassium nitrate 3%) (464.13 g) followed by T₄ (Potassium nitrate 1%) (445.49 g) and T₆ (Ortho-phosphoric acid 0.5%) (414.70 g). Treatment T₇ (Ortho-phosphoric acid 1%) (389.62 g) and T₃ (Urea 3%) (387.80 g) recorded comparatively moderate fruit weight, whereas the minimum fruit weight was

recorded in T₂ (Urea 1%) (369.30 g) followed by T₁ (Control) (371.21 g).

Post-monsoon foliar application of nutrients significantly influenced average fruit weight in mango cv. Ratna. The highest fruit weight recorded under potassium nitrate (3%) treatment might be attributed to improved nitrogen assimilation and enhanced potassium-mediated translocation of carbohydrates towards developing fruits, which promoted cell division and cell enlargement during fruit growth stages. Potassium plays a crucial role in regulating osmotic potential, enzyme activation and transport of photosynthates from source leaves to developing fruits, thereby improving sink strength and enhancing fruit size and weight. Increased fruit weight following foliar potassium nutrition has also been reported by Yeshitela *et al.* (2018)^[21] in mango. The comparatively higher fruit weight observed under potassium nitrate (1%) treatment might also be attributed to improved metabolic activity and efficient utilization of assimilates during fruit enlargement stages. Similar improvement in fruit weight due to foliar potassium application has been reported by Rana *et al.* (2021)^[16] in mango.

Improvement in fruit weight observed under orthophosphoric acid (0.5%) treatment might be attributed to enhanced phosphorus availability supporting ATP-mediated metabolic processes required for rapid cell division and fruit development. Phosphorus plays an important role in energy transfer reactions and synthesis of nucleic acids necessary for fruit growth. Similar findings were reported by Singh *et al.* (2025)^[19] in Mango cv. Dasher. The comparatively lower fruit weight recorded under control treatment might be attributed to reduced availability of nutrients required during fruit enlargement stages, resulting in limited assimilate supply to developing fruits.

Table 5: Effect of foliar application of nutrients on average fruit weight (g) at harvest stage in mango cv. Ratna

Treatment	Average fruit weight (g)		
	2021-22	2022-23	Pooled
T ₁ : Control (No spray)	391.69	350.73	371.21
T ₂ : Urea (1%)	351.97	386.63	369.30
T ₃ : Urea (3%)	383.14	392.47	387.80
T ₄ : Potassium nitrate (1%)	433.19	457.80	445.49
T ₅ : Potassium nitrate (3%)	420.59	507.67	464.13
T ₆ : Ortho-phosphoric acid (0.5%)	410.66	418.73	414.70
T ₇ : Ortho-phosphoric acid (1%)	384.57	394.67	389.62
T ₈ : Monopotassium phosphate (1%)	382.06	417.67	399.86
T ₉ : Monopotassium phosphate (3%)	377.86	414.23	396.05
Mean	392.86	415.62	404.24
S.E. ±	3.12	3.45	3.28
C.D.at 5%	9.35	10.35	9.85

Length and diameter of fruit (cm)

The results obtained on fruit length and diameter at harvest stage under different post-monsoon foliar nutrient treatments are presented in Table 6

On pooled basis, the significantly maximum fruit length was recorded in T₄ (Potassium nitrate 1%) (12.48 cm) followed by T₅ (Potassium nitrate 3%) (12.18 cm) and T₇ (Ortho-phosphoric acid 1%) (11.62 cm). Whereas the minimum fruit length was recorded in T₁ (Control) (9.96 cm) followed by T₃ (Urea 3%) (10.03 cm). And the significantly maximum fruit diameter was recorded in T₅ (Potassium nitrate 3%) (8.00 cm) followed by T₃ (Urea 3%) (7.84 cm) and T₄ (Potassium nitrate 1%) (7.66 cm). Treatment T₆ (Ortho-phosphoric acid 0.5%) (7.42 cm) and T₇ (Ortho-phosphoric acid 1%) (7.30 cm) were next in order. The minimum fruit diameter was recorded in T₁ (Control) (6.79 cm).

The increase in fruit length observed under potassium nitrate treatments might be attributed to improved potassium-mediated assimilate translocation and enhanced nitrogen metabolism during fruit enlargement stages. Potassium plays a vital role in regulation of cell elongation, enzyme activation and osmotic balance, which promote longitudinal growth of developing fruits. The comparatively higher fruit length recorded under orthophosphoric acid treatments might be attributed to improved phosphorus availability supporting ATP-dependent metabolic processes required during rapid cell division and elongation stages of fruit development. Similar findings were reported by Mahmood *et al.* (2020)^[10] in mango. Moderate improvement observed under monopotassium phosphate treatments might be due to the combined role of phosphorus and potassium in improving sink strength and metabolic activity of developing fruits. Similar observations were reported by Singh *et al.* (2021)^[16] in mango.

The increase in fruit diameter observed under potassium nitrate treatments might be attributed to enhanced potassium-mediated transport of carbohydrates and regulation of cellular turgor pressure during fruit enlargement stages. Potassium plays an important role in maintaining osmotic balance and promoting radial expansion of fruit tissues. Similar improvement in fruit diameter following foliar potassium application has been reported by Bhandari *et al.* (2018)^[13] in mango. The comparatively higher fruit diameter recorded under urea (3%) treatment might be attributed to improved nitrogen availability supporting synthesis of structural proteins and enzymes associated with fruit enlargement processes. The comparatively lower fruit diameter recorded under control treatment might be attributed to reduced assimilate availability during fruit development stages due to absence of supplemental nutrient supply. Similar findings were reported by Chaudhary *et al.* (2022)^[5] in mango.

Table 6: Effect of foliar application of nutrients on length and diameter of fruit (cm) in mango cv. Ratna

Treatment	Length of fruit (cm)			Diameter of fruit (cm)		
	2021-22	2022-23	Pooled	2021-22	2022-23	Pooled
T ₁ : Control (No spray)	9.85	10.06	9.96	6.71	6.87	6.79
T ₂ : Urea (1%)	10.20	10.51	10.36	7.06	7.22	7.14
T ₃ : Urea (3%)	10.23	9.83	10.03	7.74	7.94	7.84
T ₄ : Potassium nitrate (1%)	12.53	12.43	12.48	7.56	7.75	7.66
T ₅ : Potassium nitrate (3%)	12.12	12.25	12.18	7.92	8.09	8.00
T ₆ : Ortho-phosphoric acid (0.5%)	10.52	12.10	11.31	7.33	7.50	7.42
T ₇ : Ortho-phosphoric acid (1%)	11.34	11.90	11.62	7.21	7.38	7.30
T ₈ : Monopotassium phosphate (1%)	10.34	11.38	10.86	7.06	7.26	7.16
T ₉ : Monopotassium phosphate (3%)	11.20	11.26	11.23	7.05	7.23	7.14
Mean	10.93	11.3	11.11	7.29	7.47	7.38
S.E. ±	0.16	0.20	0.12	0.18	0.19	0.18
C.D.at 5%	0.50	0.62	0.36	0.55	0.56	0.55

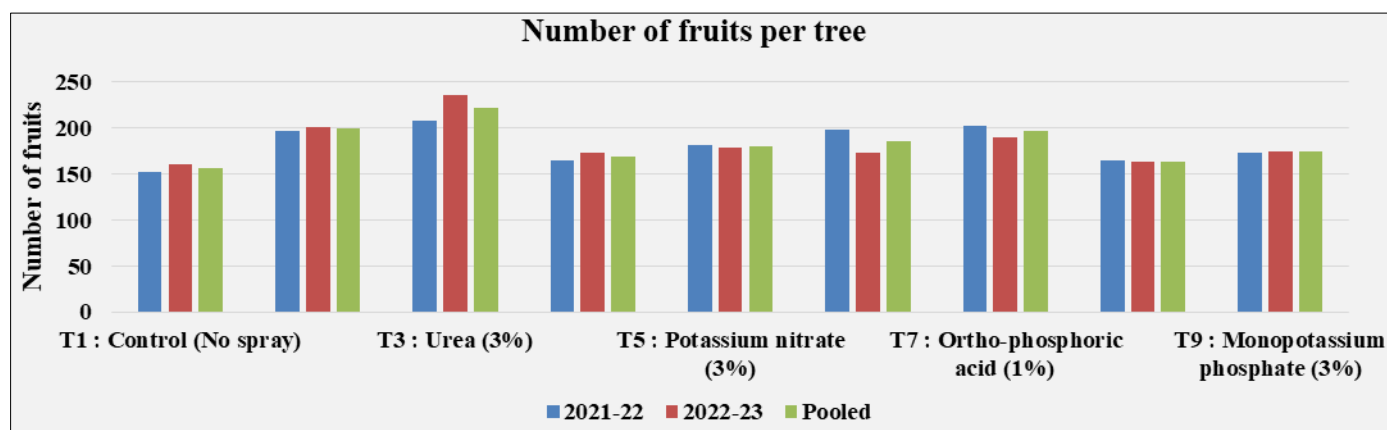


Fig 1: Effect of foliar application of nutrients on number of fruits per tree in mango cv. Ratna

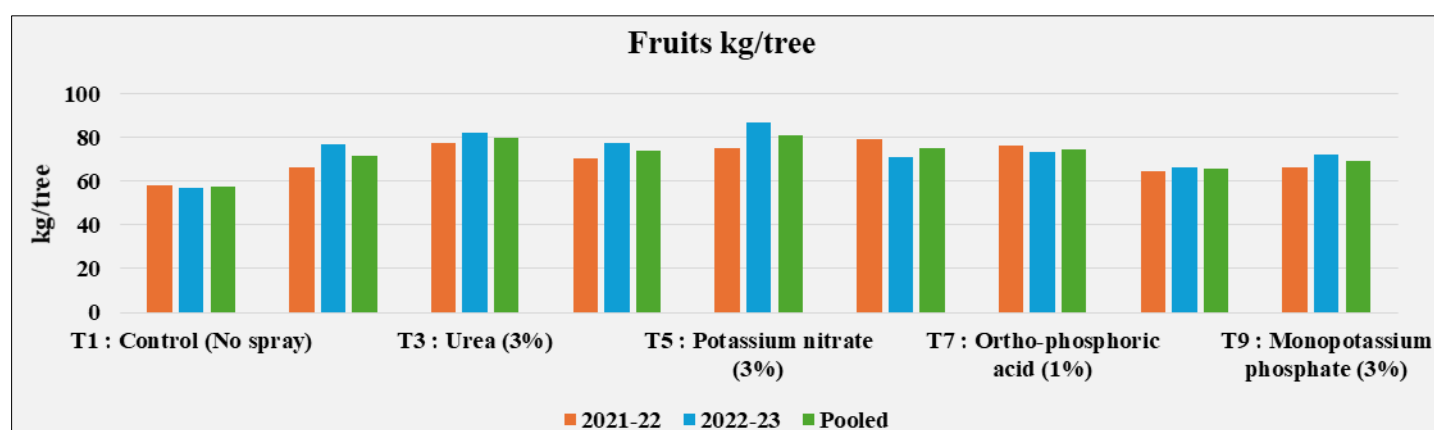


Fig 2: Effect of foliar application of nutrients on fruits kg/tree in mango cv. Ratna

Treatment Details

- T₁: Control (No spray)
- T₂: Urea (1%)
- T₃: Urea (3%)
- T₄: Potassium nitrate (1%)
- T₅: Potassium nitrate (3%)
- T₆: Ortho-phosphoric acid (0.5%)
- T₇: Ortho-phosphoric acid (1%)
- T₈: Monopotassium phosphate (1%)
- T₉: Monopotassium phosphate (3%)

Conclusion

The result of the present investigation clearly indicated that the post-monsoon foliar application of nutrients significantly influenced days required for harvesting from flowering and from fruit set, Number of fruits per tree, Fruit yield (Kg/tree) of mango cv. Ratna. Among different nutrient treatments, foliar application of potassium nitrate at 3 per cent recorded least days taken for harvesting from flowering, least days taken for harvesting from fruit set, highest fruit yield (Kg/tree), Average fruit weight while highest number of fruits per tree recorded in treatment T₃ Urea 3%. The study established that post-monsoon foliar application of potassium nitrate at 3% is an effective for least days taken for harvesting from flowering and from fruit set, highest fruit yield (Kg/tree), Average fruit weight in mango cv. Ratna under the agro-climatic conditions of the Konkan region

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