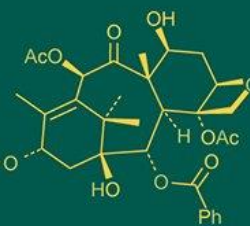
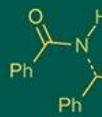


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Studies on effect of foliar application of water-soluble fertilizers on fruiting and yield parameters of mango (*Mangifera indica* L.) cv. Dashehari

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Abstract

A field experiment was conducted to assess the effect of Water-Soluble Fertilizers on fruiting and yield parameters of Mango (*Mangifera indica* L.) cv. Dashehari. The experiment was laid out with nine treatments and three replications consisted 8 different treatments namely Control (water spray), NPK (19:19:19) @ 1%, NPK (19:19:19) @ 2%, Mono Ammonium Phosphate (12:61:0) @ 1%, Mono Ammonium Phosphate (12:61:0) @ 2%, Potassium Nitrate (13:0:45) @ 1%, Potassium Nitrate (13:0:45) @ 2%, Urea Phosphate (17:44:0) @ 1%, Urea Phosphate (17:44:0) @ 2%. The results revealed that plants treated with Potassium Nitrate (13:0:45) @ 2% showed a greater effect on the various fruiting and yield parameters of plants viz., fruit length, fruit diameter, fruit volume, specific gravity, pulp percentage, peel weight, stone weight and Pulp: stone ratio. As far as the treatment Potassium Nitrate (13:0:45) @ 2% gave the greater result viz., fruit length, fruit diameter, fruit volume, specific gravity, pulp percentage, peel weight, stone weight and Pulp: stone ratio were observed under the treatment T₀ Control (water spray). Thus a spray of Potassium Nitrate (13:0:45) @ 2% is best for enhanced fruit length, fruit diameter, pulp percent and different quality attributes of mango.

Keywords: NPK, water-soluble fertilizers, quality attributes, yield parameters

1. Introduction

Mango (*Mangifera indica* L.) is one of the most important fruit crops cultivated commercially across tropical and subtropical regions worldwide. Belonging to the family Anacardiaceae. It originated in Southeast Asia. The genus *Mangifera* comprises 69 species (Kostermans and Bampard, 1993) [4], though *Mangifera indica* accounts for nearly all edible varieties. In India, three species are found *M. indica*, *M. sylvatica* and *M. coloneura*. Mangoes have been cultivated for over 4,000 years, resulting in a wide array of cultivars with diverse flavours, shapes and sizes (De Candolle, 1904) [2]. Mango is a highly nutritious fruit, prized for its rich flavour and excellent taste. It serves as a valuable source of vitamin A (4,800 IU per 100 g) and vitamin C (13 mg per 100 g). One of the major factor contributing to low mango productivity is imbalanced fertilization. Research has shown that supplying nutrients through foliar feeding either as a substitute or a supplement to soil application significantly enhances fruit yield and quality (Samra *et al.*, 1977) [6]. Foliar application of Nutrients is a common practice to address nutrient deficiencies and improve fruit quality. When applied directly to leaves these inputs have a significant positive effect on fruit set, yield and overall quality. They also aid in the recovery of trees facing nutritional or physiological stress (Singh *et al.*, 2005) [8]. The principle behind foliar feeding is that nutrients are rapidly absorbed by the leaves and then distributed throughout the plant to meet its functional needs.

2. Materials and Methods

The experiment was conducted during the academic year 2025-26 at the Horticulture Farm, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). The research trial was laid out in a Randomized Block Design (RBD) consist 9 different treatments *i.e.* T₀ = Control (water spray), T₁ = NPK (19:19:19) @ 1%, T₂ = NPK (19:19:19) @ 2%, T₃ = Mono Ammonium Phosphate (12:61:0) @ 1%, T₄ = Mono Ammonium Phosphate (12:61:0)

@ 2%, T₅ = Potassium Nitrate (13:0:45) @ 1%, T₆ = Potassium Nitrate (13:0:45) @ 2%, T₇ = Urea Phosphate (17:44:0) @ 1%, T₈ = Urea Phosphate (17:44:0) @ 2% replicated thrice in 27 well developed mango tree having distance 10m. x 10m. All interculture operation and plant protection measures were applied uniformly to the entire experiment plot as per the practises for papaya cultivation. water-soluble fertilizers were applied on 8 January, 25 February and 24 March, between 7:00-12:00 noon. Sprays of varying concentrations were applied during the pre-flowering stage, pea and marble stages of fruit development. The stock solution of NPK (19:19:19), Mono Ammonium Phosphate (12:61:0), Potassium Nitrate (13:0:45) and Urea Phosphate (17:44:0) was prepared by measure the weight of these fertilizer by weighing machine. These weighted sample was dissolved in water to makes up the required amount of solution. The plants were sprayed with the help of Foot sprayer with fine nozzle having mist droplets and the sprayer was washed thoroughly before spraying to avoid contamination. The observations were recorded on growth characters of mango viz. fruit length (cm), fruit diameter (cm), fruit volume (cm³), fruit specific gravity (g/cc), peel weight (g), pulp percent, stone weight and Pulp: stone ratio. The data were subjected to statistical analysis to test the level of significance as per method by Gomez and Gomez (1984) [3].

3. Results and Discussion

Data in table 1 show that influence of Water-Soluble Fertilizers on fruiting and yield parameters of Mango.

3.1 Fruit length (cm)

Among the evaluated treatments, the highest Fruit length (11.46) was observed in T₆, whereas T₀ exhibited the lowest Fruit length (8.11). It may be due to the increased rate of cell enlargement and the development of wider intercellular spaces during the later stages of fruit growth are primarily responsible for the elongation of fruit. In addition, nitrogen being a highly mobile macronutrient is readily translocated to developing fruits which act as strong nutrient sinks. This mobility supports various metabolic processes within the plant, further enhancing fruit elongation (Singh *et al.*, 2005) [8]. Abd *et al.*, 2022 [1], reported similar observations, noting that the increase in fruit length may be attributed to the pivotal role of nitrogen in photosynthate assimilation and developmental processes.

3.2 Fruit diameter (cm)

Among the evaluated treatments, the highest fruit diameter (7.36) was observed in T₆, whereas T₀ exhibited the lowest fruit diameter (4.72). The exogenous application of potassium fertilizer enhances photosynthetic assimilation, promotes cell expansion and facilitates the translocation of sugars to metabolic sinks such as developing fruits. Among potassium sources, foliar application of potassium nitrate (KNO₃) has been found to be particularly effective in increasing fruit diameter (Yeshitela *et al.*, 2005) [9].

3.3 Fruit volume (cm³)

The observation of data for fruit volume after spraying water-soluble fertilizers at different concentrations are illustrated in Table 1 in which the highest fruit volume (225.26) was observed in T₆, whereas T₀ exhibited the lowest fruit volume (144.34). The observed increase in fruit

volume may be attributed to the rapid translocation and accumulation of water and sugars resulting from the exogenous application of water-soluble fertilizers, particularly potassium-based formulations. Potassium contributes significantly by promoting the formation of larger intercellular spaces and regulating cellular water content, thereby enhancing fruit size and volume.

3.4 Specific gravity (g/cc)

The result in table 1 show the effect of water-soluble fertilizers on specific gravity of fruit. Among the evaluated treatments, the highest specific gravity of fruit (1.08) was observed in T₀, whereas T₆ exhibited the lowest specific gravity of fruit (1.01). Specific gravity is directly corelated with fruit weight and variation in fruit weight affect the specific gravity of fruit.

3.5 Pulp percentage

The application of different water-soluble fertilizers had significantly influenced the pulp percentage as compared to control. Among the evaluated treatments, the highest fruit pulp percent (72.62) was observed in T₆, whereas T₀ exhibited the lowest fruit pulp percent (54.84). The increase in pulp weight can be attributed to potassium, which stimulates diverse enzymatic activities and promotes the accumulation of sugars in developing fruits. Additionally, nitrogen contributes by facilitating auxin synthesis in plants so overall the use of nitrogen provide plant a good amount of nitrogen and potassium which further enhancing pulp weight which are also responsible for overall enhancement of fruit pulp percent. (Meena *et al.*, 2024) [5]

3.6 Peel weight (g)

The obtained data in respect to weight of peel after spraying water-soluble fertilizers at different concentrations, the lowest peel weight (29.38) was observed in T₆, whereas T₀ exhibited the highest peel weight (30.82).

3.7 Stone weight (g)

The observation of data in respect to stone weight after spraying water-soluble fertilizers at different concentrations are illustrated in Table 1 in which the lowest stone weight (32.86) was observed in T₆, whereas T₀ exhibited the highest stone weight (38.84).

3.8 Pulp: stone ratio

It is evident from the result obtained under present investigation the application of different water-soluble fertilizers had significantly influenced the pulp: stone ratio. Among the evaluated treatments, the highest pulp: stone ratio (5.05) was observed in T₆, whereas T₀ exhibited the lowest pulp: stone ratio (2.16). The observed increase in the pulp: stone ratio may be attributed to the rapid translocation of metabolites and photosynthetic assimilates, synthesis of auxins, accumulation of sugars from source to sink (*i.e.*, fruits), the efficient mobilization of nutrients and the enhanced rate of water absorption which was observed due to foliar feeding of nitrogen and potassium through application of potassium nitrate within the plant. These combined physiological processes contribute to a higher proportion of pulp relative to stone, thereby improving fruit quality. (Singh *et al.*, 2005) [8]. The research findings are in confirmation with Sarkar and Rahim (2013) [7].

Table 1: Effect of Water-Soluble Fertilizers on fruiting and yield parameters of Mango cv. Dashehar

Notations	Fruit length (cm)	Fruit diameter (cm)	Fruit volume 3	Specific gravity (g/cc)	Peel weight (g)	Weight of stone (g)	Pulp (%)	Pulp: stone ratio
T ₀	8.11	4.72	144.34	1.08	30.82	38.84	54.84	2.16
T ₁	8.97	5.16	174.72	1.02	30.24	36.96	61.80	2.95
T ₂	10.02	5.48	186.48	1.01	29.86	36.24	64.92	3.37
T ₃	10.31	6.24	193.96	1.02	29.72	34.78	66.95	3.82
T ₄	10.82	6.72	204.52	1.01	29.64	34.22	68.86	4.18
T ₅	11.22	7.22	216.38	1.04	29.86	33.28	72.27	4.87
T ₆	11.46	7.36	225.26	1.01	29.38	32.86	72.62	5.05
T ₇	8.54	5.54	158.39	1.02	29.92	37.58	58.18	2.51
T ₈	8.82	5.82	167.42	1.02	29.48	37.16	60.42	2.74
SE (m)±	0.19	0.12	2.45	0.02	NS	0.58	0.97	0.05
C.D 0.05	0.56	0.37	7.34	NS	NS	1.74	2.90	0.14

4. Conclusion

The result of this experiment is concluded that during the pre-flowering, pea and marble stages of mango fruit development, foliar application of 2% potassium nitrate (KNO₃) markedly enhanced fruit length, fruit diameter, fruit volume, pulp percent, and pulp: stone ratio. The 2% KNO₃ treatment also significantly affect the peel weight, stone weight and specific gravity which was found lowest in this treatment. Thus, a spray of Potassium Nitrate @ 2% is best for fruiting and yield characters of mango.

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6. Competing Interests

The authors have no conflicts of interest to declare regarding this manuscript.

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