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Effect of different level of N, P and K on growth, yield and soil status of Guava under meadow orchard system

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Abstract
The present investigation “Standardization of N, P and K dose for meadow orchard system in guava” was carried out to evaluate effects of different doses of N, P and K on the growth, flowering, yield and quality parameters of Guava variety L-49 at Fruit Research Station, Lal Baug, CoH, JAU, Junagadh, during the years 2022-23 and 2023-24. The experiment was laid out in RBD with Factorial concept consisting three levels of nitrogen N_1:30, N_2:60 and N_3:90 g/plant, two levels of phosphorus P_1:15 and P_2:30 g/plant and three levels of potash K_1:15, K_2:30 and K_3:45 g/plant. The results revealed that the maximum plant height and maximum stem girth were recorded with treatment N_3, P_2 and K_2. For yield and yield attributing parameters, maximum number of fruits/plant, fruit weight, fruit length, fruit diameter, yield/plant was recorded in treatment N_3, P_2 and K_2. For soil nutrient status the highest available nitrogen in the soil was observed with the treatment N_3. Highest available phosphorus (P_2O_5) in the soil was observed with the treatment P_2. Highest available potash (K_2O) in the soil was observed with the treatment K_3. The interaction effect of nitrogen, phosphorus and potash showed that maximum plant height and stem girth (cm) was observed in N_3P_2. Maximum, number of fruits/plant, fruit weight, and yield/plant were observed in N_3K_2.

Keywords: Guava, meadow orchard, nitrogen, phosphorus, potash, growth, yield, available N, Available P, Available K

Introduction
The guava, *Psidium guajava* L., is a member of the Myrtaceae family. Guava is known as the “apple of the tropics” or “poor man’s fruit.” According to Singh *et al*. (2000) [38], guava is one of India's most promising fruit crops and one of the most exquisitely nutritious and profitable crops. Effects of climate changes directly influence maturity and development of fruit crops, leading to shifts in phenology, modifications in fruit yield, and alterations in fruit composition. To ensure the continued production and sustainability of fruit crops, building resilience becomes of utmost importance. Innovative cultivation methods that boost productivity and fruit quality are constantly sought after to meet rising global demand and boost guava farming's profitability (Karagatiya *et al*. 2023) [18].

Traditional planting methods make it difficult to achieve optimal yields, as large plants produce less fruit per unit area and require four to five years to reach commercial bearing. This delays profitability and increases production costs. With ever increasing land costs and the need for early returns on invested capital, there is a worldwide trend toward high density plantings/meadow orcharding (Sah *et al*. 2018) [29].

The amount of nutrients that plants remove from the soil is significantly higher and more importantly, varies depending on the conditions of the soil because of the increased plant population per unit area. High-density planting intensifies competition for nutrients among trees. Balanced application of NPK is thus, necessary to maintain a synchronized growth cycle and achieve high-quality fruit under high-density conditions (Singh *et al*. 2016; Tiwari *et al*. 2020) [37, 43]. Fertilizer costs constitute a significant portion of production expenses. The development of standardized fertilization guidelines will equip guava farmers with actionable insights to optimize their fertilization practices. This situation requires targeted research to establish precise

NPK recommendations tailored to the specific needs of guava in the meadow orchard system. Such recommendations will enable growers to optimize nutrient application, minimize resource wastage, and ensure timely delivery of nutrients to their orchards.

Materials and Methods

An investigation on "Standardization of N, P and K dose for meadow orchard system in guava" was conducted at Fruit Research Station, Lalbaug, College of Horticulture, Junagadh Agricultural University, Junagadh during the year 2022-23 and 2023-24. The experimental material for the present investigation was comprised of eighteen treatments (Table 1).

Table 1: Treatment details

Sr No.	Treatment Combination	Sr No.	Treatment Combination	Sr No.	Treatment Combination
1	$N_1P_1K_1$	7	$N_2P_1K_1$	13	$N_3P_1K_1$
2	$N_1P_1K_2$	8	$N_2P_1K_2$	14	$N_3P_1K_2$
3	$N_1P_1K_3$	9	$N_2P_1K_3$	15	$N_3P_1K_3$
4	$N_1P_2K_1$	10	$N_2P_2K_1$	16	$N_3P_2K_1$
5	$N_1P_2K_2$	11	$N_2P_2K_2$	17	$N_3P_2K_2$
6	$N_1P_2K_3$	12	$N_2P_2K_3$	18	$N_3P_2K_3$

Factor A (Levels of nitrogen)	Factor B (Levels of phosphorus)	Factor C (Levels of potash)
N_1 - 30 g/plant	P_1 - 15 g/plant	K_1 - 15 g/plant
N_2 - 60 g/plant	P_2 - 30 g/plant	K_2 - 30 g/plant
N_3 - 90 g/plant		K_3 - 45 g/plant

The experimental material consisted of 1 year old guava plants cultivar Lucknow-49. These plants are spaced at 2 m × 1 m distance. In all 216 uniform plants of guava were selected for the experimentation. All the experimental plants were managed with uniform cultural practices as per the standard recommendations with respect to farm yard manures, irrigation and plant protection measures during investigation. The experiment was laid out in randomized block design with factorial concept.

Results and Discussion

1. Response of N, P and K on Growth parameters

1.1 Plant Height (m)

1.1.1 Effect of nitrogen, phosphorus and potash

The data in table 2 reveals different levels of nitrogen, phosphorus and potash on initial plant height was found non-significant during the years 2022-23 and 2023-24 as well as in pooled analysis. Significantly maximum plant height after harvest 2.24, 2.51 and 2.38 m was recorded in the treatment N_3 during both the years and the pooled data respectively. This underscores the importance of nitrogen in promoting shoot elongation and vigorous vegetative growth.

Significantly maximum plant height after harvest was found in the treatment P_2 (2.20 m) during first year and (2.47 m) during second year as well as in pooled data (2.33 m) despite the lack of significant differences in initial height. This suggests that the optimal amount of phosphorus contributes to long-term growth by enhancing root development, nutrient uptake and overall metabolic processes.

Table 2: Response of different levels of N, P and K on plant height and stem girth of guava under meadow orchard system

Treatment	Plant height (m)						Stem girth (cm)					
	Initial			After harvest			Initial			After harvest		
Nitrogen (N)												
	22-23	23-24	Pooled	22-23	23-24	Pooled	22-23	23-24	Pooled	22-23	23-24	Pooled
N_1	0.923	1.12	1.02	2.03	2.28	2.16	8.89	14.41	11.65	11.72	16.93	14.32
N_2	0.926	1.14	1.03	2.11	2.37	2.24	9.19	15.14	12.17	12.26	18.44	15.35
N_3	0.928	1.15	1.04	2.24	2.51	2.38	9.31	15.91	12.61	13.16	19.50	16.33
S.Em.±	0.022	0.022	0.015	0.035	0.040	0.027	0.155	0.262	0.271	0.238	0.308	0.195
C.D. 5%	NS	NS	NS	0.10	0.12	0.08	NS	0.75	1.65	0.68	0.89	0.55
Phosphorus (P)												
P_1	0.925	1.13	1.03	2.06	2.31	2.18	9.02	14.84	11.93	11.89	17.47	14.68
P_2	0.927	1.15	1.04	2.20	2.47	2.33	9.24	15.48	12.36	12.87	19.11	15.99
S.Em.±	0.018	0.018	0.013	0.029	0.033	0.022	0.126	0.214	0.124	0.194	0.251	0.159
C.D. 5%	NS	NS	NS	0.08	0.09	0.06	NS	0.62	0.35	0.56	0.72	0.45
Potassium (K)												
K_1	0.922	1.12	1.02	2.07	2.32	2.20	8.94	14.61	11.78	11.81	17.29	14.55
K_2	0.930	1.16	1.04	2.20	2.47	2.33	9.29	15.68	12.49	13.08	19.21	16.15
K_3	0.925	1.14	1.03	2.12	2.38	2.25	9.16	15.18	12.17	12.25	18.37	15.31
S.Em.±	0.022	0.022	0.015	0.035	0.040	0.027	0.155	0.262	0.152	0.238	0.308	0.195
C.D. 5%	NS	NS	NS	0.10	0.12	0.08	NS	0.75	0.43	0.68	0.89	0.55
Interaction (N x P)												
S.Em.±	0.031	0.031	0.022	0.050	0.057	0.038	0.219	0.371	0.215	0.336	0.436	0.275
C.D. 5%	NS	NS	NS	0.14	0.16	0.11	NS	NS	NS	0.97	1.25	0.78
Interaction (N x K)												
S.Em.±	0.038	0.038	0.027	0.061	0.070	0.046	0.268	0.454	0.264	0.412	0.533	0.337
C.D. 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Interaction (P x K)												
S.Em.±	0.031	0.031	0.022	0.050	0.057	0.038	0.219	0.371	0.215	0.336	0.436	0.275
C.D. 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Interaction (N x P x K)												
S.Em.±	0.053	0.053	0.038	0.087	0.098	0.066	0.379	0.642	0.373	0.582	0.754	0.477
C.D. 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV%	10.00	8.08	8.94	7.06	7.14	7.12	7.18	7.34	7.52	8.15	7.14	7.61
		S.Em.±	C.D. 5%		S.Em.±	C.D. 5%		S.Em.±	C.D. 5%		S.Em.±	C.D. 5%
Year (N x P)		0.031	NS		0.054	NS		0.304	NS		0.389	NS
Year (N x K)		0.038	NS		0.066	NS		0.373	NS		0.477	NS
Year (P x K)		0.031	NS		0.054	NS		0.304	NS		0.389	NS
Year (N x P x K)		0.053	NS		0.093	NS		0.527	NS		0.674	NS

The effect various levels of potash on plant height after harvest during the first year had no significant difference. But, data significantly varied and maximum plant height after harvest was recorded in the treatment with treatment K_2 (2.20 m) for first year, (2.47 m) for second year and (2.33 m) pooled data respectively. Although these values were lower than those of the nitrogen and phosphorus treatments, potassium still supported vegetative growth, likely by enhancing enzyme activation and water regulation.

1.1.2 Interaction effect

The interaction effects of different levels of nitrogen (N), phosphorus (P) and potassium (K) on both initial plant height and plant height after harvest were found to be non-significant for both years and the pooled results. The only exception was the effect of N and P on plant height at harvest as in table 3. Significantly maximum plant height at harvest was observed in treatment combination N_3P_2 (2.38 m) during first year, (2.68 m) during second year and (2.38 m) in pooled analysis.

The observations indicated that the initial height of the plants was not significantly affected by the different levels of nitrogen (N), phosphorus (P) and potassium (K). This suggests that fertilizer treatment had a minimal impact on the early vegetative growth of the guava plants, which remained relatively stable. In contrast, nitrogen levels resulted in significant variations in plant height following harvest. This finding demonstrates that the meadow orchard system significantly improved plant growth performance through the synergistic interaction of higher nitrogen and phosphorus doses. Similar findings have been found by Kumar *et al.* (2009) [20], Baviskar *et al.* (2018) [3] and Bhatti *et al.* (2023) [4] in guava; Parmar *et al.* (2025) [26] and Singh *et al.* (2017) [39] in mango; Silva *et al.* (2022) [36] and Gondaliya *et al.* (2025) [12] in custard apple; Nalina *et al.* (2002) [22] and Pandey *et al.* (2002) [25] in banana; Silas *et al.* (2021) [35] in citrus.

1.2 Stem Girth (cm)

1.2.1 Effect of nitrogen, phosphorus and potash

The data in table 2 reveals the effect of different levels of nitrogen, phosphorus and potash on initial stem girth was found non-significant during the year 2022-23. Significantly maximum initial stem girth was observed in treatment N_3 (15.91 cm) in second year. Also, maximum initial stem girth was observed in treatment N_3 (12.61 cm) which was at par with N_2 (12.17 cm) followed by N_1 (11.65 cm) in pooled data. Significantly maximum stem girth after harvest (13.16 cm) was recorded in the treatment N_3 during first year and (19.50 cm) second year and (16.33 cm) in the pooled data.

Significantly maximum initial stem girth was observed in treatment P_2 (15.48 cm) in second year and (12.36 cm) pooled result. The differences in stem girth after harvest was observed to be significantly varying during both the years and in pooled analysis also. Significantly maximum stem girth after harvest (12.87 cm) was recorded in the treatment P_2 during first year and (19.11 cm) during second year as well as in pooled data (15.99 cm).

Maximum initial stem girth was observed in treatment K_2 (15.68 cm) in second year and (12.49 cm) pooled result which was at par with K_3 (15.18 am) and (12.17 cm) respectively. Maximum stem girth after harvest was found in treatment K_2 (13.08 cm) during the first year and in pooled data (16.15 cm). But, in case of second year Maximum stem girth after harvest was found in treatment K_2 (19.21 cm) which was at par with K_3 (18.37 cm).

The varying amounts of nitrogen, phosphorus and potassium applied under the meadow orchard system had a noticeable effect on the initial and post-harvest stem girth of guava plants. Stem girth is an important indicator of structural strength and vegetative vigor, which is especially significant for supporting a fruit-bearing canopy and sustaining tree growth over the seasons. Among the nitrogen treatments, treatment N_3 consistently recorded the maximum stem girth, indicating that higher nitrogen doses greatly promote post-harvest stem thickening and cumulative wood development. The most effective phosphorus treatment was P_2, which highlighted phosphorus's positive influence on vascular development and overall structural robustness. In terms of potassium, treatment K_2 also showed promising results, making it competitive with other treatments for increasing stem girth after harvest.

1.2.2 Interaction effect

The interaction effects of different levels of nitrogen (N), phosphorus (P) and potassium (K) on initial stem girth were found to be non-significant for both years and the pooled results. There was significant variation in the data of stem girth after harvest in both the years and pooled analysis as in table 3. Significantly maximum stem girth after harvest was observed in treatment combination N_3P_2 (14.17 cm) during first year and (17.41 cm) in pooled analysis respectively. While in second year maximum stem girth after harvest was also found in treatment combination N_3P_2 (20.65 cm) which was at par with treatment combination N_2P_2 (19.58 cm).

Overall, all optimal treatments significantly increased post-harvest stem girth, with N_3 showing the most notable response, followed by K_2 and P_2. These findings suggest that nitrogen is the most crucial nutrient for stem development, particularly for strengthening stems and promoting long-term vegetative growth. This underscores the importance of maintaining yield potential and supporting robust plant architecture in guava under meadow orchard systems by balancing the NPK regime, particularly with higher levels of nitrogen and potassium. The remarkable response of N_3P_2 may be attributed to the synergistic effect of enhanced nitrogen, which supports vigorous vegetative growth, and optimal phosphorus, which promotes root development and energy transfer, contributing to overall plant robustness and stem thickening.

Table 3: Interaction effect of different levels of N × P on growth parameters of guava under meadow orchard system

Treatment	Interaction (N x P)					
	Plant height (m) at harvest			Stem girth (cm)		
	22-23	23-24	Pooled	22-23	23-24	Pooled
N_1P_1	1.99	2.23	1.99	11.42	16.76	14.09
N_1P_2	2.08	2.33	2.08	12.02	17.11	14.56
N_2P_1	2.09	2.35	2.09	12.10	17.31	14.70
N_2P_2	2.13	2.39	2.13	12.42	19.58	16.00
N_3P_1	2.10	2.35	2.10	12.16	18.34	15.25
N_3P_2	2.38	2.68	2.38	14.17	20.65	17.41
S.Em.±	0.050	0.057	0.038	0.336	0.436	0.275
C.D. 5%	0.14	0.16	0.11	0.97	1.25	0.78
CV%	7.06	7.14	7.12	8.15	7.14	7.61

This suggests that even a moderate nitrogen level combined with an adequate phosphorus dose can substantially improve stem girth, though not to the same extent as the highest nitrogen level. Similar findings have been found by Bibha *et al.* (2017) [5], Khan *et al.* (2018) [19], Mushtaq *et al.* (2019) [21] and Bohara *et al.* (2024) [6] in guava; Gondaliya *et al.* (2023) [13] in custard apple; Navaneetha Krishnan *et al.* (2015) [23] in banana.; Silas *et al.*

(2021) [35] in citrus.

2. Response of N, P and K on yield parameters

2.1 Number of fruits per plant

2.1.1 Effect of nitrogen, phosphorus and potash

The analysis of data on number of fruits per plant is presented in Table 4. The results indicate that plant height was significantly influenced by varying levels of nitrogen, phosphorus, and potash. Maximum number of fruits per plant (31.06) was recorded in the treatment N_3 during first year. Whereas number of fruits per plant (26.15) was found significantly highest in treatment N_3 during the second year which was at par with the treatment N_2 (24.84) in second year. While the pooled data (28.60) recorded the highest number of fruits in the treatment N_3. The treatment N_1 resulted in the minimum number of fruits per plant (22.50) in first year and (25.36) in second year and (23.93) pooled data.

Significantly maximum number of fruits per plant (29.95) was recorded in the treatment P_2 during first year and (26.31) during second year as well as in pooled data (28.13). The treatment P_1 resulted in the minimum number of fruits per plant (27.00) in first year and (22.68) in second year and (24.84) pooled data.

The maximum number of fruits per plant was observed in treatment K_2 (30.45) in the first year, (25.92) in the second year and the pooled data averaging (28.19). In contrast, treatment K_1 resulted in the minimum number of fruits per plant, recording (27.30) in the first year, (23.78) in the second year, and an average of (25.54) in the pooled data.

2.1.2 Interaction effect

The interaction effects of different levels of nitrogen (N), phosphorus (P), and potassium (K) on number of fruits per plant were found to be non-significant for both years and the pooled results. The only exception was the effect of N and K on number of fruits per plant as in table 5. Maximum number of fruits per plant were observed in treatment combination N_3K_2 (32.11) during first year and (27.83) second year which were statistically at par with N_2K_2 (31.41 and 26.64) and N_3K_3 (31.23 and 25.47), respectively. The pooled analysis indicated that treatment combination N_3K_2 (29.97) had highest number of fruits per plant followed by N_2K_2 (29.02) and N_3K_3 (28.35), respectively. The least number of fruits per plant was observed in treatment combination N_1K_1 in both the years and pooled data.

These findings indicate that moderate to higher doses of nitrogen (N), phosphorus (P), and potassium (K) enhance the overall fruiting potential. This effect is observed not only in the number of fruits set per shoot but also in the total fruit load per plant. The cumulative effect arises from increased flowering, fruit set, and overall shoot productivity due to optimal nutrient supply. The interaction results that using a higher dose of nitrogen (90 g/plant) alongside a moderate dose of potassium (30 g/plant) significantly improves fruit set and development, leading to a greater fruit yield per plant. Nitrogen is essential for cell division and vegetative growth, which helps promote the development of more productive shoots. Conversely, potassium enhances flowering, fruit development, and the movement of photosynthates to reproductive organs.

The synergistic interaction between nitrogen and potassium at optimal levels (N_3K_2) is crucial for maximizing reproductive efficiency in guava trees grown under the meadow orchard system. Although high nitrogen levels may boost vegetative vigor, balancing it with potassium ensures that this growth effectively translates into fruit-bearing capacity without resulting in excessive vegetative growth that could hinder fruiting. The comparable performance of N_2K_2 and N_3K_3 supports the notion that either slightly lower nitrogen (60 g/plant) with optimal potassium or higher nitrogen with slightly increased potassium can still achieve relatively high fruit numbers. However, in the pooled analysis conducted over two years, N_3K_2 consistently emerged as the most effective treatment. These findings are supported by the research of Thirupathi *et al.* (2016) [42], Khan *et al.* (2018) [19] and Mushtaq *et al.* (2019) [21] in guava. Sharma *et al.* (2000) [33] and Satapathy and Banik (2002) [32] in mango, Kamalakannan *et al.* (2019) [17] in banana and Chell *et al.* (2023) [9] in pomegranate.

2.2 Fruit Weight (g)

2.2.1 Effect of nitrogen, phosphorus and potash

The analysis of data on number of fruits per plant is presented in Table 4. The data indicated that effect of different levels of nitrogen, phosphorus, and potash on fruit weight (g) was found significant during the years 2022-23 and 2023-24 as well as in pooled analysis. Maximum fruit weight (g) (125.52) was recorded in the treatment N_3 during first year which was at par with the treatment N_2 (119.26) in second year. Whereas fruit weight (g) (126.86) was found significantly highest in treatment N_3 during the second year and pooled data (126.16). The treatment N_1 resulted in the minimum fruit weight (g) (107.99) in first year and (108.37) in second year and (108.18) pooled data.

Significantly maximum fruit weight (g) (121.47) was recorded in the treatment P_2 during first year and (125.79) during second year as well as in pooled data (123.63). The treatment P_1 resulted in the minimum fruit weight (g) (113.71) in first year and (110.72) in second year and (112.22) pooled data.

The maximum fruit weight (g) was observed in treatment K_2 (123.27) in the first year, (123.81) in the second year and the pooled data averaging (123.54). In contrast, treatment K_1 resulted in the minimum fruit weight (g), recording (114.17) in the first year, (114.42) in the second year, and an average of (114.30) in the pooled data.

2.2.2 Interaction effect

The interaction effects of different levels of nitrogen (N), phosphorus (P), and potassium (K) on fruit weight (g) was found to be non-significant for both years and the pooled results. The only exception was the effect of N and K on fruit weight (g) as in table 5. Maximum fruit weight (g) was observed in treatment combination N_3K_2 (133.62) during first year which was at par with N_2K_2 and N_3K_3. While during second year maximum fruit weight (g) (132.61) was noted in in treatment combination N_3K_2 which were statistically at par with N_2K_2, N_3K_3, N_3K_1, and N_2K_1, respectively. The pooled analysis indicated that treatment combination N_3K_2 (133.12) had highest fruit weight (g) followed by N_2K_2. The least fruit weight (g) was observed in treatment combination N_1K_1 in both the years and pooled data.

Fruit size, which directly affects marketability and yield, was highest in the N_3 treatment at an average of 126.19 grams. This value was significantly greater than all other treatments and comparable to the N_2 treatment in the first year. The P_2 treatment, with an average size of 123.63 grams, and the K_2 treatment, at 123.54 grams, performed second best. This suggests that both phosphorus and potassium positively influence the development of fruit size. Phosphorus enhances the energy supply through ATP, which is vital for fruit growth, while potassium supports sugar translocation, turgor pressure, and enzymatic activity.

These findings are consistent with the research of Singh *et al.*

(2016) [37] and Das *et al*. (2012), which demonstrated the positive impact of nitrogen, phosphorus, and potassium (NPK) on guava fruit weight.

Fruit weight is a crucial parameter that significantly affects both quality and yield in fruit crops. It is directly influenced by nutrient availability, particularly macronutrients like nitrogen (N) and potassium (K). These nutrients play an essential role in promoting vegetative growth, carbohydrate synthesis, and nutrient transport to the fruit. The combination of nitrogen and potassium, specifically N3K2, may lead to a higher fruit weight due to increased photosynthetic efficiency, better nutrient transfer during fruit development, and enhanced cell division and expansion during the growth stages. Nitrogen stimulates vegetative growth and the development of leaf area, which ensures sufficient production of photosynthates. Meanwhile, potassium improves the translocation of sugars and the development of cell walls, resulting in larger and denser fruit. The broader range of statistically similar treatments observed in the second year may be attributed to more favorable climatic conditions that enhanced nutrient uptake efficiency across the treatments. Additionally, the soil's improved buffering capacity in the second season, due to residual fertility, and possibly greater plant maturity and canopy size could have led to a more stable source-sink relationship. Similar findings were reported by Sarolia *et al.* (2020) [31] and Challa *et al.* (2021) [7] in guava, Ahmed *et al*. (2011) [1] in mango, Azam *et al.* (2022) [2] in pomegranate and Navgare *et al.* (2021) [24] in banana.

2.3 Fruit Length (cm)

2.3.1 Effect of nitrogen, phosphorus and potash

The analysis of data on number of fruits per plant is presented in Table 4. The data indicated that effect of different levels of nitrogen, phosphorus, and potash on fruit length (cm) during both the years and in pooled analysis also. Significantly maximum fruit length (67.90 cm) in first year and (70.00 cm) in second year and (68.95 cm) pooled data was recorded in the treatment N_3 during. The treatment N_1 resulted in the minimum fruit length (62.87 cm) in first year and 63.23 cm) in second year and (63.05 cm) pooled data.

Significantly maximum fruit length (65.98 cm) in first year and (68.36 cm) in second year and (67.17 cm) pooled data was recorded in the treatment P_2 during. The treatment P_1 resulted in the minimum fruit length (63.35 cm) in first year and (64.71 cm) in second year and (64.03 cm) pooled data

Significantly maximum fruit length (66.91 cm) in first year and (69.73 cm) in second year and (68.32 cm) pooled data was recorded in the treatment K_2 during. This treatment's performance was statistically comparable to that of treatment K_3, which achieved noteworthy averages of (64.18) during first year. The treatment K_1 resulted in the minimum fruit length (62.89 cm) in first year and (64.76 cm) in second year and (63.82 cm) pooled data.

2.3.2 Interaction effect

The interaction effects of varying levels of N, P, and K on fruit length (cm) were found to be non-significant during both years and in the pooled results.

Fruit length is an important morphological parameter that significantly affects the physical appearance, marketability, and consumer preference for guava fruits. The results of the current study indicate that fruit length was notably influenced by the levels of nitrogen, phosphorus, and potassium in the meadow orchard system of guava cultivation. The increase in fruit length observed under the N_3 treatment is likely due to nitrogen's essential role in protein synthesis, vegetative growth, and leaf area development. These factors enhance photosynthetic activity, thereby promoting better fruit development. Additionally, nitrogen plays a critical role in hormonal regulation, particularly in the synthesis of auxins and cytokinins, which are directly involved in the elongation of fruit cells. Phosphorus is essential for energy transfer mechanisms (such as ATP), root development, and reproductive processes, all of which positively impact flower and fruit development.

The observed increase in fruit length at the P_2 level may be attributed to improved nutrient and water uptake, along with enhanced metabolic efficiency during the fruit development stage. Potassium regulates osmotic balance, enzyme activation and the translocation of photosynthates to the developing fruits. These factors are crucial for fruit elongation and enlargement. The superior performance of the K_2 treatment in terms of fruit length suggests that potassium played a vital role in enhancing cell expansion, resulting in larger and more uniform fruits. Similar beneficial effects of potassium on fruit size have been reported by Sharma *et al.* (2014) [34] and Raghavendra *et al.* (2018) [28] in guava. El-Wakeel (2005) [10] in mango.

Table 4: Response of different levels of N, P and K on yield parameters of guava under meadow orchard system

Treatment	Number of fruits per plant			Fruit weight (g)			Fruit length (cm)			Fruit diameter (cm)			Yield (t/ha)		
Nitrogen (N)															
	22-23	**23-24**	**Pooled**	**22-23**	**23-24**	**Pooled**	**22-23**	**23-24**	**Pooled**	**22-23**	**23-24**	**Pooled**	**22-23**	**23-24**	**Pooled**
N_1	25.36	22.50	23.93	107.99	108.37	108.18	62.87	63.23	63.05	61.81	63.88	62.85	13.77	12.03	12.90
N_2	29.00	24.84	26.92	119.26	119.53	119.40	63.20	66.38	64.79	64.21	66.89	65.55	17.40	14.91	16.15
N_3	31.06	26.15	28.60	125.52	126.86	126.19	67.90	70.00	68.95	66.90	69.44	68.17	19.58	16.63	18.11
S.Em.±	0.535	0.465	0.354	2.318	2.524	1.713	0.993	1.181	0.772	1.162	1.289	0.868	0.426	0.379	0.285
C.D at 5%	1.54	1.34	1.00	6.67	7.26	4.84	2.86	3.40	2.18	3.34	3.71	2.45	1.23	1.09	0.81
Phosphorus (P)															
P_1	27.00	22.68	24.84	113.71	110.72	112.22	63.35	64.71	64.03	61.69	64.60	63.15	15.54	12.59	14.06
P_2	29.95	26.31	28.13	121.47	125.79	123.63	65.98	68.36	67.17	66.93	68.88	67.90	18.30	16.46	17.38
S.Em.±	0.437	0.379	0.289	1.893	2.061	1.399	0.811	0.964	0.630	0.949	1.052	0.708	0.348	0.310	0.233
C.D at 5%	1.26	1.09	0.82	5.44	5.93	3.95	2.33	2.77	1.78	2.73	3.03	2.00	1.00	0.89	0.66
Potassium (K)															
K_1	27.30	23.78	25.54	114.17	114.42	114.30	62.89	64.76	63.82	62.17	64.98	63.58	15.85	13.51	14.68
K_2	30.45	25.92	28.19	123.27	123.81	123.54	66.91	69.73	68.32	67.21	70.01	68.61	18.86	16.30	17.58
K_3	27.66	23.78	25.72	115.33	116.54	115.93	64.18	65.12	64.65	63.54	65.23	64.39	16.05	13.76	14.91
S.Em.±	0.535	0.465	0.354	2.318	2.524	1.713	0.993	1.181	0.772	1.162	1.289	0.868	0.426	0.379	0.285
C.D at 5%	1.54	1.34	1.00	6.67	7.26	4.84	2.86	3.40	2.18	3.34	3.71	2.45	1.23	1.09	0.81

Interaction (N x P)															
S.Em.±	0.757	0.657	0.501	3.278	3.569	2.423	1.405	1.670	1.091	1.643	1.823	1.227	0.603	0.536	0.403
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Interaction (N x K)															
S.Em.±	0.927	0.805	0.614	4.015	4.371	2.968	1.721	2.046	1.337	2.013	2.233	1.503	0.738	0.657	0.494
C.D. at 5%	2.67	2.32	1.73	11.55	12.57	8.38	NS	NS	NS	NS	NS	NS	2.12	1.89	1.40
Interaction (P x K)															
S.Em.±	0.757	0.657	0.501	3.278	3.569	2.423	1.405	1.670	1.091	1.643	1.823	1.227	0.603	0.536	0.403
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Interaction (N x P x K)															
S.Em.±	1.311	1.138	0.868	5.678	6.182	4.197	2.433	2.893	1.890	2.846	3.157	2.125	1.044	0.929	0.699
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV%	7.97	8.05	8.03	8.36	9.05	8.72	6.52	7.53	7.06	7.67	8.19	7.95	10.69	11.07	10.89
		S.Em.±	C.D. 5%		S.Em.±	C.D. 5%		S.Em.±	C.D. 5%		S.Em.±	C.D. 5%		S.Em.±	C.D. 5%
Year (N x P)		0.709	NS		3.427	NS		1.543	NS		1.735	NS		0.570	NS
Year (N x K)		0.868	NS		4.197	NS		1.890	NS		2.125	NS		0.699	NS
Year (P x K)		0.709	NS		3.427	NS		1.543	NS		1.735	NS		0.570	NS
Year (N x P x K)		1.228	NS		5.935	NS		2.673	NS		3.006	NS		0.988	NS

Table 5: Interaction effect of different levels of N × K on Number of fruits per plant, fruit weight and yield (t/ha) of guava under meadow orchard system

Treatment	Number of fruits per plant			Fruit weight (g)			Yield (t/ha)		
	Interaction (N x K)								
	2022-23	2023-24	Pooled	2022-23	2023-24	Pooled	2022-23	2023-24	Pooled
N_1K_1	22.92	20.94	21.93	100.53	99.85	100.19	11.56	10.48	11.02
N_1K_2	27.84	23.30	25.57	108.31	110.61	109.46	15.13	13.07	14.10
N_1K_3	25.31	23.25	24.28	115.12	114.65	114.89	14.63	12.55	13.59
N_2K_1	29.14	25.27	27.21	121.32	121.68	121.50	17.88	14.97	16.43
N_2K_2	31.41	26.64	29.02	127.88	128.21	128.05	19.95	17.17	18.56
N_2K_3	26.45	22.62	24.54	108.59	108.70	108.64	14.36	12.58	13.47
N_3K_1	29.85	25.14	27.49	120.67	121.72	121.19	18.09	15.07	16.58
N_3K_2	32.11	27.83	29.97	133.62	132.61	133.12	21.49	18.66	20.07
N_3K_3	31.23	25.47	28.35	122.28	126.26	124.27	19.16	16.16	17.66
S.Em.±	0.776	0.876	0.585	4.015	4.371	2.968	0.738	0.657	0.494
C.D at 5%	2.23	2.52	1.65	11.55	12.57	8.38	2.12	1.89	1.40
CV%	7.97	8.05	8.03	8.36	9.05	8.72	10.69	11.07	10.89

2.4 Fruit Diameter (cm)

2.4.1 Effect of nitrogen, phosphorus and potash

The analysis of data on number of fruits per plant is presented in Table 4. The data indicated that effect of different levels of nitrogen, phosphorus, and potash on fruit diameter (cm) during both the years and in pooled analysis also. Significantly maximum fruit diameter (cm) (66.90) in first year and (69.44) in second year and (68.17) pooled data was recorded in the treatment N_3 during. This treatment's performance was statistically comparable to that of treatment N_2, which achieved noteworthy averages of (64.21) and (66.89) during both the years. The treatment N_1 resulted in the minimum fruit diameter (cm) (61.81) in first year and (63.88) in second year and (62.85) pooled data.

Significantly maximum fruit diameter (cm) (66.93) in first year and (68.88) in second year and (67.90) pooled data was recorded in the treatment P_2 during. The treatment P_1 resulted in the minimum fruit diameter (cm) (61.69) in first year and (64.60) in second year and (63.15) pooled data.

Significantly maximum fruit diameter (cm) (67.21) in first year and (70.01) in second year and (68.61) pooled data was recorded in the treatment K_2 during. The treatment K_1 resulted in the minimum fruit diameter (cm) (62.17) in first year and (64.98) in second year and (63.58) pooled data.

2.4.2 Interaction effect

The interaction effects of varying levels of N, P, and K on fruit diameter (cm) were found to be non-significant during both years and in the pooled results.

Fruit diameter is a crucial indicator of girth and bulk, significantly influencing market acceptability, visual appeal, and consumer preference for guava. This investigation revealed that different levels of nitrogen, phosphorus, and potassium had a significant impact on fruit diameter. The findings indicate that applying a balanced and adequate supply of nutrients enhances the overall size and shape of guava fruits. Nitrogen is essential for vigorous vegetative growth, chlorophyll production, and amino acid synthesis, which together increase photosynthetic activity and result in greater assimilates available for fruit development. The larger fruit diameter observed with the highest nitrogen level (N_3) is likely due to improved nutrient assimilation and cell division, particularly in the early stages of fruit development. Phosphorus plays a vital role in establishing a strong root system and is crucial for energy transfer (ATP), flower formation, and fruit development.

The moderate level of phosphorus used (P_2) likely facilitated efficient nutrient transport, timely flowering, and balanced fruit development, contributing positively to fruit diameter. Potassium is critical for the transport of sugars, enzyme activation, and the maintenance of cell turgor, all of which foster fruit enlargement and uniform girth. The enhanced performance under the moderate potassium treatment (K_2) suggests that potassium significantly contributes to improving fruit diameter by regulating metabolic activities, enhancing the translocation of assimilates, and promoting uniform fruit development. These findings align with the observations of Chavan *et al*. (2020) [3] in guava, Hasan *et al.* (2013) [15] and Vala *et al.* (2020) [45] in mango

2.4.3 Yield Per Hectare (T/Ha)
2.4.3.1 Effect of nitrogen
The data presented in table 4 revealed that significant differences in yield per hectare (t/ha) was observed because of different levels of nitrogen during both the years and in pooled analysis also presented in Table 4.12. Significantly maximum yield per hectare (t/ha) was recorded in the treatment N_3 during (19.58) first year, (16.63) in second year and pooled data (18.11). The treatment N_1 resulted in the minimum yield per hectare (t/ha) (13.77) in first year and (12.03) in second year and (12.90) pooled data.

Significantly maximum yield per hectare (18.30 t/ha) was recorded in the treatment P_2 during first year and (16.46) during second year as well as in pooled data (17.38). The treatment P_1 resulted in the minimum yield per hectare after harvest (15.54 t/ha) in first year and (12.59 t/ha) in second year and (14.06 t/ha) pooled data.

Maximum yield per hectare was found in treatment K_2 (18.86 t/ha) in first year, (16.30 t/ha) in second year and in pooled data (17.58 t/ha). While minimum yield per hectare for both the years and pooled data was found in treatment K_1 (15.85, 13.51 and 14.68 t/ha), respectively.

2.4.3.2 Interaction effect
The interaction effects of different levels of nitrogen (N), phosphorus (P), and potassium (K) on yield per hectare (t/ha) was found to be non-significant for both years and the pooled results. The only exception was the effect of N and K yield per hectare (t/ha) as in table 5. Maximum yield per hectare (t/ha) was observed in treatment combination N_3K_2 (21.49 t/ha) during first year and (18.66 t/ha) during second year which was at par with N_2K_2 (19.95 t/ha and 17.17 t/ha) during both the years, respectively. The pooled analysis indicated that treatment combination N_3K_2 (20.07) had highest yield per hectare (t/ha). The lowest yield per hectare (t/ha) was observed in treatment combination N_1K_1 in both the years and pooled data.

Fruit yield per hectare is the primary criterion for evaluating the productivity and economic viability of an orchard system. Optimized nutrient management is essential to support the intensive resource demands of closely spaced trees in high-density planting systems, such as the meadow orchard. The current findings indicate that nitrogen (N), phosphorus (P), potassium (K), and particularly the interaction between nitrogen and potassium (N × K) significantly influence guava fruit yield per hectare. Among the nitrogen treatments, the N_3 treatment (90 g N/plant/year) consistently recorded the highest yield per hectare. The observed increase in yield with greater nitrogen doses can be attributed to enhanced vegetative vigor and canopy development, which promote photosynthetic capacity, improved fruit set and retention resulting in a higher number of fruits per plant, as well as greater carbohydrate synthesis and its allocation towards reproductive organs.

A moderate supply of phosphorus proved optimal, likely due to its roles in stimulating root growth, which leads to better nutrient absorption, supporting energy metabolism and reproductive development, as well as aiding flower initiation and fruit development. Balanced phosphorus levels can also increase fruit size and uniformity. However, phosphorus levels that are too low or too high can hinder the use of other nutrients and potentially have adverse effects. In terms of potassium, the K_2 treatment (30 g K_2O/plant/year) yielded the highest results. Its performance, comparable to K_3 in the second year, suggests that both moderate and slightly higher potassium levels are effective. The improved yields associated with K_2 can be related to potassium's essential functions, such as enhancing carbohydrate metabolism and transport to fruits, maintaining turgor pressure, improving fruit firmness, and reducing fruit drop, all of which contribute to increased fruit weight and overall yield per hectare.

The interaction effect between nitrogen and potassium (N × K) was highly significant for yield per hectare. The combination of higher nitrogen (N_3) and moderate potassium (K_2) was the most synergistic, maximizing yield. This can be explained by their complementary effects: nitrogen promotes growth and fruit set, while potassium ensures proper translocation of assimilates to the fruits. This results in enhanced source-sink efficiency, where the increased vegetative output from N_3 is effectively utilized for fruit production due to the mobilization capabilities of K_2. A balanced nutrient environment minimizes nutrient antagonism and promotes optimal physiological functions. The comparable performance of N_2K_2 and N_3K_3 in some seasons suggests that there is a range of optimal nutrient combinations, although N_3K_2 remains the most stable and productive across both years and pooled data. These findings are supported by the research of Tomar and Tomar (2012) [44], Mushtaq *et al.* (2019) [21], Chavan *et al.* (2020) [3] and Bhatti *et al.* (2023) [4] in guava, Satapathy and Banik (2002) [32] in mango, Suresh Kumar *et al.* (2011) [40] in custard apple and Yellapu *et al.* (2023) [47] in papaya.

3. Effect on soil available nutrient
3.1 Available nitrogen (N kg/ha)
3.1.1 Effect of nitrogen, phosphorus and potash
The data pertaining to soil available nitrogen (kg/ha) revealed that effect of different levels of nitrogen on soil available nitrogen was significantly affected in the year 2022-23, 2023-24 and in pooled data as seen in table 6. Significantly highest available nitrogen in the soil (246.95, 227.38 and 237.17 kg/ha) was observed with the application of the treatment N_3 in both the year and pooled data, respectively. Whereas, treatment N_1 was resulted lowest available nitrogen in the soil (222.24, 212.00 and 217.12 kg/ha) during both the year and pooled analysis, respectively.

An analysis of the data represented that soil available nitrogen (kg/ha) was found non-significant due to different levels of phosphorus and potash in the year 2022-23, 2023-24 and in pooled data.

3.1.2 Interaction effect
All the interaction effect of different levels of N, P and K on soil available nitrogen (kg/ha.) during both the year and in pooled data was found non-significant.

The results regarding the available nitrogen content in the soil showed that the highest levels were observed in the first year at 246.95 kg/ha, in the second year at 227.38 kg/ha, and the pooled mean at 237.17 kg/ha, all recorded under the N_3 treatment, which corresponds to the highest nitrogen application level. This clearly demonstrates a direct and positive relationship between the amount of nitrogen applied and the residual nitrogen content in the soil, aligning with the expected nutrient accumulation effect from higher nitrogen doses. However, the effects of different levels of phosphorus and potassium on available soil nitrogen were found to be non-significant. This indicates that neither phosphorus nor potassium fertilization had a measurable impact on the residual nitrogen content in the soil under the experimental conditions. The absence of any interaction effects suggests that nitrogen dynamics in the soil are primarily governed by the direct application rate of nitrogen, rather than being significantly influenced by phosphorus and potassium levels. This reinforces the importance of optimizing nitrogen management independently to improve soil nitrogen status in guava orchards. These findings align with the observations of Gupta *et al.* (2000) [14], Verma *et al.* (2012) [46] and Palepad (2020).

3.2 Available Phosphorus (P_2O_5 kg/ha)

3.2.1 Effect of nitrogen, phosphorus and potash

An analysis of the data represented in table 6 indicated that soil available phosphorus (P_2O_5 kg/ha) was found non-significant due to different levels of nitrogen and potash in the year 2022-23, 2023-24 and pooled data. The perusal data to soil available phosphorus (P_2O_5 kg/ha) revealed that effect of different levels of phosphorus on soil available phosphorus was significantly affected in the year 2022-23, 2023-24 and in pooled data. Significantly highest available phosphorus in the soil (30.59, 26.92 and 28.75 kg/ha) was observed with the application of the treatment P_2 in both the year and pooled data, whereas lowest available phosphorus in the soil (27.82, 24.84 and 26.33 kg/ha) was observed with the application of phosphorus P_1 during both the year and pooled data, respectively.

3.2.2 Interaction effect

All the interaction effect of different levels of N, P and K on soil available phosphorus (P_2O_5 kg/ha) during both the year and in pooled analysis was found non-significant.

Table 6: Response of different levels of N, P and K on available soil N, P and K status in guava under meadow orchard system

Treatment	Available soil N			Available soil P			Available soil K		
Nitrogen (N)									
	22-23	**23-24**	**Pooled**	**22-23**	**23-24**	**Pooled**	**22-23**	**23-24**	**Pooled**
N1	222.24	212.00	217.12	28.75	25.51	27.13	295.19	275.13	285.16
N2	231.19	218.10	224.65	29.85	26.36	28.11	295.40	275.64	285.52
N3	246.95	227.38	237.17	29.02	25.76	27.39	295.50	275.84	285.67
S.Em.±	3.696	3.188	2.440	0.462	0.348	0.289	4.592	3.587	2.914
C.D at 5%	10.63	9.17	6.89	NS	NS	NS	NS	NS	NS
Phosphorus (P)									
P1	232.30	218.08	225.19	27.82	24.84	26.33	294.93	275.19	285.06
P2	234.62	220.24	227.43	30.59	26.92	28.75	295.80	275.88	285.84
S.Em.±	3.018	2.603	1.992	0.378	0.284	0.236	3.749	2.929	2.379
C.D at 5%	NS	NS	NS	1.09	0.82	0.67	NS	NS	NS
Potassium (K)									
K1	234.14	220.04	227.09	28.62	25.47	27.05	285.74	267.83	276.78
K2	233.17	218.82	226.00	29.24	25.91	27.58	292.97	268.31	280.64
K3	233.06	218.63	225.85	29.75	26.25	28.00	307.39	290.47	298.93
S.Em.±	3.696	3.188	2.440	0.462	0.348	0.289	4.592	3.587	2.914
C.D at 5%	NS	NS	NS	NS	NS	NS	13.21	10.32	8.23
Interaction (N x P)									
S.Em.±	5.226	4.508	3.451	0.654	0.492	0.409	6.494	5.073	4.120
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS
Interaction (N x K)									
S.Em.±	6.401	5.521	4.227	0.801	0.602	0.501	7.953	6.214	8.684
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS
Interaction (P x K)									
S.Em.±	5.226	4.508	3.451	0.654	0.492	0.409	6.494	5.073	4.120
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS
Interaction (N x P x K)									
S.Em.±	9.053	7.808	5.977	1.133	0.852	0.709	11.248	8.787	7.137
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV%	6.72	6.17	6.47	6.72	5.70	6.30	6.60	5.52	6.12
		S.Em.±	C.D. 5%		S.Em.±	C.D. 5%		S.Em.±	C.D. 5%
Year (N x P)		4.881	NS		0.579	NS		5.827	NS
Year (N x K)		5.977	NS		0.709	NS		7.137	20.16
Year (P x K)		4.881	NS		0.579	NS		5.827	NS
Year (N x P x K)		8.453	NS		1.002	NS		10.093	NS

The analysis of available phosphorus content in the soil showed that the highest values recorded were 30.59 kg/ha in the first year, 26.92 kg/ha in the second year, and 28.75 kg/ha in the pooled data under treatment P_2, which corresponds to the application of the recommended dose of phosphorus. This indicates that moderate phosphorus application is more effective in maintaining higher residual phosphorus levels in the soil compared to other application levels. In contrast, the effects of varying nitrogen levels on available phosphorus were found to be non-significant, suggesting that nitrogen application does not have a notable impact on the residual phosphorus status in the soil. Similarly, the influence of different potassium levels on available phosphorus was also non-significant. These findings imply that the dynamics of phosphorus in the soil of the guava meadow orchard system are primarily driven by direct phosphorus fertilization, with minimal influence from nitrogen or potassium levels. These findings align with the observations of Santhy, (1995) [30], Pothare *et al.* (2007) [27] and Jain *et al.* (2020) [16]

3.3 Available Potash (K_2O kg/ha)

3.3.1 Effect of nitrogen, phosphorus and potash

An analysis of the data represented that soil available potash (K_2O kg/ha) was found non-significant due to different levels of nitrogen and phosporus in the year 2022-23, 2023-24 and pooled data as in table 6.

The perusal data to soil available potash revealed that effect of different levels of potash on soil available potash (K_2O kg/ha) was significantly affected in the year 2022-23, 2023-24 and in pooled data. Significantly highest available potash in the soil (307.39, 290.47 and 298.93 kg/ha) was observed with the application of the treatment K_3 in both the year and pooled data, respectively. Whereas, treatment K_1 was resulted lowest available nitrogen in the soil (285.74, 267.83 and 276.78 kg/ha) during both the year and pooled analysis, respectively.

3.3.2 Interaction effect

All the interaction effect of different levels of N, P and K on soil available potash (K_2O kg/ha) during both the year and in pooled analysis was found non-significant.

The data on available potash content in the soil indicated that the highest values recorded were 307.39 kg/ha in the first year, 290.47 kg/ha in the second year, and 298.93 kg/ha in the pooled data, all under treatment K_3, which represents the highest level of potassium application. This demonstrates a clear correlation between increased potash application and its residual availability in the soil. However, the effects of different levels of nitrogen and phosphorus on available potash content were found to be non-significant. This suggests that neither nitrogen nor phosphorus fertilization had a noticeable influence on residual potassium levels. These findings highlight that potassium accumulation in the soil is primarily driven by its direct application rather than interactions with nitrogen or phosphorus within the guava meadow orchard system. Gathala *et al.* (2007) [11] and Thanki *et al.* (2025) [41]

Conclusion

Based on results obtained from present investigation it can be concluded that various doses of N, P and K for meadow orchard system in Guava (withholding irrigation in March and pruning upto 90 cm during May) reported better on growth, yield attributing characters and soil N, P and K status. Among doses of nitrogen, treatment N_3 (90 g) recorded better for growth parameters *viz.* plant height and stem girth. Treatment N_3 (90 g) recorded higher yield parameters *viz.* number of fruits per plant, fruit weight (g), length (cm), diameter (cm) and yield (t/ha). Effect of phosphorus, P_2 (30 g) and Potash K_2 (30 g) was best in all the growth and yield parameters. For interaction effects, the treatment combination of N_3P_2 (N:90 g and P:30 g) resulted in higher plant height and stem girth. Whereas, the treatment combination of N_3K_2 (N:90 g and K:30 g) resulted in higher number of fruits per plant, fruit weight (g) and yield (t/ha).

Hence, for getting better growth and flowering in meadow orchard of guava should be fertilized with N 90 g, P 30 g and K 30 g per plant for its individual effect.

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