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INFLUENCE OF WEATHER PARAMETERS ON FLORAL INDUCTION AND DIFFERENTIATION IN MANGO (*MANGIFERA INDICA* L.) VARIETIES

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ABSTRACT

The study entitled “Influence of Weather Parameters on Floral Induction and Differentiation in Mango (*Mangifera indica* L.) varieties was conducted from November 2023 to June 2025 at the College of Horticulture, Venkataramannagudem, Dr. YSR Horticultural University, Andhra Pradesh. Nine mango varieties Alphonso, Amrapali, A.U. Rumani, Banganapalli, Kesar, Mallika, Ratna, Royal Special, and Totapuri were evaluated to assess the impact of climatic conditions on shoot differentiation. Sixty shoots per tree were tagged, and observations were recorded to classify them into vegetative, floral, or dormant types. Results revealed significant varietal differences in the proportion of shoot types across both seasons. *Ratna* consistently recorded the highest floral shoot percentage (72.15% in 2023–24 and 77.96% in 2024–25) and the lowest vegetative and dormant shoot percentages, indicating its superior floral induction ability. In contrast, *Alphonso* exhibited the lowest floral and highest vegetative and dormant shoot percentages.

Key Words: Mango, Floral shoots, Vegetative shoots, Night temperature, Dormant shoots

Introduction

Mango (*Mangifera indica* L.) of the family Anacardiaceae is an important tropical fruit grown widely, with major production centers in India, China, and Thailand. It ranks as the fifth-largest fruit crop in terms of production volume. Mango flowering is a complex phenological process influenced by both genotype and environmental factors. In tropical regions, lower night temperatures are required for floral bud initiation, while high daytime temperatures may suppress the process. In subtropical regions, extended shoot rest periods are often more important for floral induction than temperature changes (Ramírez & Davenport, 2010). Endogenous factors such as carbohydrate availability, hormonal regulation—particularly gibberellin inhibition—and the expression of florigenic genes (e.g., *FLOWERING LOCUS T*-like proteins) also influence floral initiation

(Núñez-Elisea & Davenport, 1995). Varietal differences affect flowering behavior, especially in the proportion of vegetative, dormant, and floral shoots, due to variation in thermal thresholds, shoot rest duration, and climatic sensitivity (Kulkarni, 1991). Under variable climatic conditions, cultivars with stable floral induction often show better fruit set and yield consistency (Ramírez *et al.*, 2021). Recent climatic variability, including unseasonal rains, warmer winters, and changing humidity, has altered flowering cycles and affected mango productivity (Verheye, 2010). Comparative studies on varietal differences in shoot-type distribution under changing conditions are limited, though such evaluations across seasons are important for breeding and orchard management aimed at improving flowering stability and yield.

Material and Methods

The present investigation entitled “Influence of

Table 1: Influence of mango varieties on vegetative shoot (%).

Varieties	Vegetative shoot (%)		
	2023-24	2024-25	Pooled
Alphonso	26.67(5.26)	18.45(4.41)	22.56(4.85)
Amrapali	20.00(4.58)	13.29(3.78)	16.65(4.20)
A.U.Rumani	18.33(4.39)	12.75(3.70)	15.54(4.06)
Banganapalli	25.67(5.16)	15.15(4.01)	20.41(4.62)
Kesar	24.67(5.06)	11.16(3.48)	17.92(4.34)
Mallika	21.58(4.75)	14.14(3.89)	17.86(4.32)
Ratna	15.39(4.04)	10.52(3.39)	12.96(3.73)
Royal special	23.78(4.97)	18.53(4.41)	21.16(4.70)
Totapuri	17.12(4.25)	12.07(3.61)	14.60(3.94)
SE m(+)	0.03	0.02	0.01
CD at 5%	0.08	0.06	0.04

Figures in parenthesis indicate square root transformed values.

Weather Parameters on Floral Induction and Differentiation in Mango (*Mangifera indica* L.) Varieties” was undertaken during the period from November 2023 to June 2025 at the College of Horticulture, Venkataramannagudem, affiliated with Dr. YSR Horticultural University, located in West Godavari district, Andhra Pradesh. The experimental material comprised ten-year-old mango trees representing nine distinct varieties, viz., Alphonso, Amrapali, Au Rumani, Banganapalli, Kesar, Mallika, Ratna, Royal Special, and Totapuri. The trees were grown under uniform management conditions following recommended horticultural practices. The experimental site was located at Instructional farm in College of Horticulture, Venkataramannagudem, Dr. YSR Horticultural University, West Godavari District, Andhra Pradesh. The location falls under Agro-climatic zone-10, humid, East Coast Plain and hills with an average rainfall of 900mm at an altitude of 34m above mean sea level. The experimental site is at 16°63’120’’N latitude 81° 27’568’’E longitude. It experiences hot humid summer and mild winter.

Procedure of Tagging Panicles

A representative sample of mango trees was carefully selected. The shoots likely to bear flowers were identified

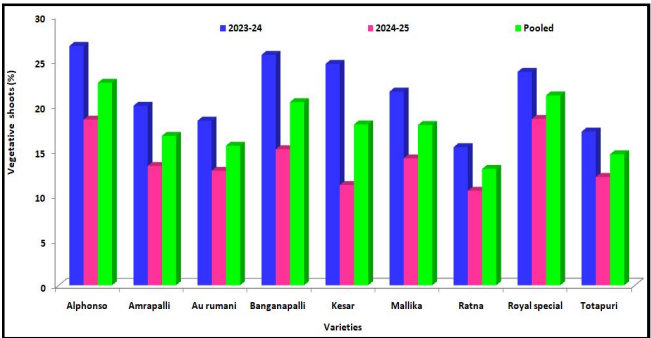


Fig. 1: Vegetative shoot (%) in mango varieties.

Table 2: Influence of mango varieties on dormant shoot (%).

Varieties	Dormant shoot (%)		
	2023-24	2024-25	Pooled
Alphonso	24.33(5.03)	20.55(4.64)	22.44(4.84)
Amrapali	12.67(3.69)	11.57(3.54)	12.12(3.62)
A.U.Rumani	17.65(4.31)	17.19(4.26)	17.42(4.29)
Banganapalli	16.00(4.12)	14.37(3.92)	15.19(4.02)
Kesar	13.98(3.87)	13.39(3.79)	13.69(3.83)
Mallika	15.34(4.04)	14.69(3.96)	15.02(4.02)
Ratna	12.46(3.66)	11.52(3.53)	11.99(3.60)
Royal special	13.16(3.76)	12.65(3.69)	12.91(3.72)
Totapuri	14.23(3.90)	13.09(3.75)	13.66(3.82)
SE m(+)	0.04	0.03	0.04
CD at 5%	0.10	0.09	0.10

Figures in parenthesis indicate square root transformed values.

by examining panicle primordia. Total sixty shoots were tagged for one tree. Coloured plastic tags, each uniquely numbered for easy identification, were used to tag the selected shoots. Tag numbers, along with the date of tagging and the developmental stage of the panicles, were recorded. This systematic approach was consistently applied to all selected mango trees. After successful tagging of the shoots, flowering observations were recorded in an efficient manner. The tagged shoots were vigilantly observed regularly.

Assessment of Shoot Types

At the end of the observational period, each tagged shoot was categorized into one of the following three types based on visual and morphological characteristics: vegetative, floral, or dormant. The classification and percentage calculations were performed using the formulas detailed below.

Vegetative shoots(%)

Vegetative shoot percentage was determined by identifying the shoots that remained vegetative after bud burst. The percentage was calculated using the following formula:

$$\text{Vegetative shoot percentage (\%)} = \frac{\text{Number of vegetative shoots}}{\text{Total number of tagged shoots}} \times 100$$

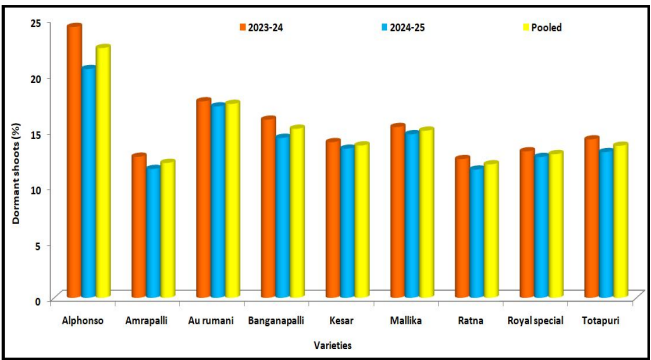


Fig. 2: Dormant shoot (%) in mango varieties.

Floral shoots (%)

Floral shoot percentage was determined by identifying the panical emergence after bud burst. The percentage was calculated using the following formula:

$$\text{Floral shoot percentage (\%)} = \frac{\text{Number of floral shoots}}{\text{Total number of tagged shoots}} \times 100$$

Dormant shoots (%)

Dormant shoot percentage was determined by identifying the panical emergence after bud burst. The percentage was calculated using the following formula:

$$\text{Dormant shoot percentage (\%)} = \frac{\text{Number of dormant shoots}}{\text{Total number of tagged shoots}} \times 100$$

Statistical analysis

The data from the study was subjected to analysis in a Randomized Block Design (RBD) by using the R Software.

Results and Discussion

Vegetative shoot (%)

In 2023–24, *Ratna* recorded the lowest vegetative shoot percentage (15.39%), followed by *Totapuri* (17.12%), while *Alphonso* showed the highest (26.67%), significantly surpassing other varieties. In 2024–25, the lowest percentage was again observed in *Ratna* (10.52%), followed by *Kesar* (11.16%), whereas *RoyalSpecial* recorded the highest (18.53%). Pooled data indicated *Ratna* consistently had the lowest vegetative shoot percentage (12.96%), and *Alphonso* the highest (22.56%), both showing significant differences from other varieties. The results revealed significant differences in the percentage of vegetative shoots among the varieties during both years and in the pooled data, which may be attributed to a strong genetic influence combined with environmental factors such as temperature and rainfall. Varieties with higher vegetative shoot percentages are likely to possess genotypes favoring vegetative flushing over reproductive or dormant phases during the observed period. Environmental factors also play a crucial role, moderate to warm temperatures typically accelerate metabolic processes and stimulate cell division necessary

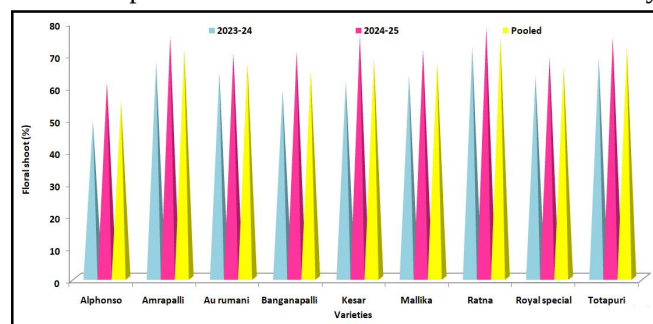


Fig. 3: Floral shoot (%) in mango varieties.

Table 3: Influence of mango varieties on floral shoot (%).

Varieties	Floral shoot (%)		
	2023-24	2024-25	Pooled
Alphonso	49.00(44.40)	61.00(51.33)	55.00(47.85)
Amrapali	67.33(55.12)	75.14(60.08)	71.24(57.54)
A.U.Rumani	64.02(53.12)	70.06(56.81)	67.04(54.94)
Banganapalli	58.33(49.77)	70.48(57.07)	64.41(53.35)
Kesar	61.35(51.54)	75.45(60.28)	68.40(55.77)
Mallika	63.08(52.56)	71.17(57.50)	67.13(54.99)
Ratna	72.15(58.13)	77.96(61.99)	75.06(60.01)
Royal special	63.06(52.55)	68.82(56.04)	65.94(54.27)
Totapuri	68.65(55.93)	74.84(59.88)	71.75(57.86)
SE m(+)	0.21	0.23	0.22
CD at 5%	0.63	0.65	0.64

Figures in parenthesis indicate square root transformed values.

for shoot development. Specifically, the increased vegetative shoot percentage observed in 2023 may be due to higher rainfall during December, which enhanced soil moisture and created favorable conditions for shoot initiation and elongation. Adequate soil moisture improves nutrient uptake and cell turgor pressure, thereby facilitating vigorous shoot growth. Varietal sensitivity to climatic variations may cause some genotypes to favor dormancy or reproductive growth under less favorable conditions. Similar varietal differences in vegetative growth were also reported Thangaraj *et al.*, (2025) in mango.

Dormant shoot (%)

During 2023–24, the lowest dormant shoot percentage was observed in *Ratna* (12.46%), followed by *Amrapali* (12.67%), both significantly lower than other varieties. The highest was recorded in *Alphonso* (24.33%). In 2024–25, *Ratna* again recorded the lowest percentage (11.52%), followed by *Amrapali* (11.57%), while *Alphonso* exhibited the highest (20.55%). Pooled data confirmed this trend, with *Ratna* (11.99%) and *Amrapali* (12.12%) showing the lowest values, indicating a reduced dormancy tendency, whereas *Alphonso* consistently showed the highest dormant shoot percentage (22.44%) across both years. The observed variation in dormant shoot percentage among the mango varieties may be attributed to inherent genetic differences in shoot maturation and bud behavior. Varieties like *Alphonso*, known for their alternate bearing tendency, often exhibit a higher proportion of dormant shoots due to incomplete or delayed floral induction under suboptimal weather conditions (Majumder and Sharma, 1990; Yadav *et al.*, 2020). On the other hand, varieties like *Ratna*, which are known for their regular bearing habit, tend to have fewer dormant shoots and a higher transition of vegetative buds to reproductive phases, thereby enhancing floral shoot percentage (Kumar *et al.*, 2014).

Floral Shoot (%)

In 2023–24, the highest floral shoot percentage was recorded in *Ratna* (72.15%), followed by *Totapuri* (68.65%), both significantly higher than other varieties. The lowest was observed in *Alphonso* (49.00%), which was significantly inferior. In 2024–25, *Ratna* again showed the highest floral shoot percentage (77.96%), followed by *Kesar* (75.45%), while *Alphonso* recorded the lowest (61.00%). Pooled data confirmed the trend, with *Ratna* (75.06%) and *Totapuri* (71.75%) showing the highest floral shoot percentages, and *Alphonso* (55.00%) the lowest, indicating a comparatively reduced reproductive tendency. The proportion of floral shoots exhibited significant variation among mango varieties during both 2023–24 and 2024–25, as well as in the pooled analysis, might be due to strong genetic control over floral shoot initiation. Varieties consistently showing higher floral shoot percentages may be likely possess an inherent tendency towards reproductive growth over vegetative activity, driven by distinct genetic expression of flowering-promoting genes, hormonal interactions, and carbohydrate accumulation within shoots (Kumar *et al.*, 2021; Thakur and Reddy, 2023). The marked increase in floral shoot percentage observed in 2024 compared to 2023 may be explained due to lower temperatures experienced during the floral induction period, particularly in November and December 2024. Mango flower initiation is highly sensitive to temperature fluctuations, with cool weather during pre-flowering stages promoting floral induction by inhibiting gibberellin synthesis and stimulating the transition of vegetative buds into floral buds. In contrast, the warmer temperatures during the same period in 2023 likely favored vegetative flushing over reproductive development, thus reducing floral shoot percentages. Similar results were observed by Thangaraj (2025) in mango.

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