



# Plant Archives

Journal homepage: <http://www.plantarchives.org>

DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2025.v25.no.2.408>

## FLOWERING BEHAVIOUR AND YIELD PARAMETERS OF OFF-SEASON MANGO (*MANGIFERA INDICA* L.) VARIETIES UNDER CENTRAL TELANGANA CONDITIONS

A. Sushma<sup>1\*</sup>, V. Suchitra<sup>2</sup>, P. Harikanth<sup>3</sup> and G. Sathish<sup>4</sup>

<sup>1</sup>Department of Fruit Science, SKLTGHU, Mulugu, Siddipet, Telangana, India.

<sup>2</sup>Fruit Research Station, Sangareddy, SKLTGHU, Telangana, India

<sup>3</sup>Department of Fruit Science, Fruit Research Station, Sangareddy, SKLTGHU, Telangana, India

<sup>4</sup>Department of Agricultural Statistics, PGIHS, SKLTGHU, Mulugu, Siddipet, Telangana, India.

\*Corresponding author E-mail: [arishamsushma98@gmail.com](mailto:arishamsushma98@gmail.com)

(Date of Receiving-24-07-2025; Date of Acceptance-27-09-2025)

### ABSTRACT

The present investigation evaluated the flowering behavior and yield performance of different mango (*Mangifera indica* L.) cultivars under off-season conditions in Central Telangana. Significant genotypic variation was observed among cultivars for panicle emergence, floral traits and yield parameters. The earliest panicle emergence was recorded in Baramasi (9 April), while the latest was in Ratna (28 May), indicating potential for staggered market availability. Among floral traits, Neelum produced the longest panicles (30.00 cm), while Thambuva recorded the widest (27.33 cm). The highest number of flowers per panicle was noted in Ratna (1572.33), followed by Neelum (1402.33), while Tephala had the lowest (1071.33). Flowering duration ranged from 22.67 days in Ratna to 30.00 days in Thambuva. Higher sex ratio was observed in Neelum (0.74) and Ratna (0.72), indicating better reproductive efficiency.

In terms of yield attributes, Ratna was superior with the highest number of fruits per panicle (5.67) and maximum off-season yield (86.00 kg/plant), while Thambuva excelled in fruit weight (480.96 g) and pulp weight (272.80 g) while Royal Special registered highest pulp-to-stone ratio (5.59). Conversely, Baramasi recorded the lowest pulp-to-stone ratio (2.01).

Overall, the study demonstrated that Ratna was superior for fruit set and yield. Thambuva is ideal for fruit size and pulp quality and Royal Special is well-suited for processing pickles. These results emphasize the importance of varietal selection to enhance off-season mango production and improve market value in Central Telangana.

**Key words:** Mango, Off-season flowering, Yield parameters, Panicle emergence, Genotypic variability

### Introduction

Mango (*Mangifera indica* L.) popularly known as the “King of Fruits,” is one of the most important and cherished fruit crops in the tropics and subtropics. It holds immense nutritional, economic and cultural significance worldwide. The fruit is rich in sugars, organic acids, dietary fiber, vitamins and a wide range of antioxidants, making it highly valued for human health. Beyond its nutritional attributes, mango contributes significantly to farmer income, rural livelihoods and export markets. India occupies a pre-eminent position in mango production

contributing over 40% of global output with leading states including Uttar Pradesh, Andhra Pradesh, Telangana, Maharashtra and Karnataka (Singh *et al.*, 2017).

Traditionally, mango is a distinctly seasonal fruit crop with production concentrated during the summer months (March to June in most regions of India). This seasonality often creates market glut during peak harvesting and scarcity during the rest of the year. In recent years the emergence of off-season flowering has provided a unique opportunity to extend the availability of fresh mangoes beyond the regular season, offering

benefits such as extended consumer access, premium market prices and enhanced farmer profitability. Off-season flowering refers to the ability of certain cultivars to produce flowers and fruits outside the main season, usually influenced by specific genetic traits, agro-climatic factors and orchard management practices.

Previous studies have revealed large variations among mango varieties with respect to time of panicle emergence, duration of flowering, floral sex ratio and fruit set efficiency, all of which ultimately determine productivity. For example, some cultivars exhibit early panicle emergence and long flowering duration whereas others produce shorter more synchronized flowering periods. Similarly, the sex ratio is a key determinant of fruit set with higher ratios generally linked to superior yields.

Therefore, the present investigation was undertaken to study the flowering and fruiting behavior of eight mango varieties under Central Telangana agro-climatic conditions, with the objective of identifying cultivars that could be recommended for off-season cultivation. This study aims to fill the existing knowledge gap and provide a scientific basis for varietal selection in the region, thereby supporting both farmers and consumers through year-round mango availability.

## Materials and Methods

The investigation was conducted at the Fruit Research Station, Sangareddy, Telangana, located in the Central Telangana Agro-Climatic Zone during 2024–2025. The station lies at a (17.63°N latitude and 78.08°E longitude). The region is characterized by a semi-arid tropical climate, erratic rainfall, averaging around 850–900 mm annually, mostly received during the southwest monsoon (June–September). Eight mango varieties were evaluated: Baramasi ( $T_1$ ), Thambuva ( $T_2$ ), Tephala ( $T_3$ ), Royal Special ( $T_4$ ), Bobbili Punasa ( $T_5$ ), Neelum ( $T_6$ ), Neelum × Baneshan ( $T_7$ ) and Ratna ( $T_8$ ). Observations were recorded on flowering attributes (panicle emergence date, panicle length and width, number of flowers per panicle, duration of flowering, sex ratio) and fruiting (number of fruits per panicle, fruit weight, fruit length and breadth, peel and pulp weight, peel thickness peel to pulp ratio and yield). Data were analyzed statistically using a Randomized Block Design (RBD) with three replications. The statistical assessment was carried by using OPSTAT, an open-source agricultural data analysis tool provided by CCSHAU, Hissar.

### Flowering Attributes

#### Date of panicle emergence

For analyzing the date of panicle emergence, five

shoots were selected from different directions in each replication of every treatment and the date of the first panicle emergence was recorded.

#### Length of panicle (cm)

The length of panicle was measured using a measuring scale and the average length was represented in centimetres (cm).

#### Width of panicle (cm)

The width of panicles was determined using a measuring scale and the average width was represented in centimetres (cm).

#### Duration of flowering (days)

The start of the flower bloom was carefully recorded every day and the date of the panicle's appearance was noted. The flowering duration was determined then in days.

#### Number of flowers per panicle

To determine the total number of flowers per panicle five panicles facing various directions were selected.

#### Sex Ratio

By dividing the total number of hermaphrodite flowers by the total number of male flowers the male to hermaphrodite flower ratio was calculated.

### Yield Attributes

#### Number of fruits per panicle

In a separate set of panicles orientated with various directions the number of fruits developed under open pollination conditions was recorded and the average was calculated.

#### Weight of fruit (g)

After the harvest fruits were accurately weighed in grammes using a automatic digital weighing balance their average weight was determined.

#### Length of fruit (cm)

When the fruits were completely mature, they were harvested. From each cultivar in each replication three fruits were chosen from different direction and their length was measured with a measuring scale in centimetres.

#### Breadth of fruit (cm)

Using a measuring scale, mature fruits were randomly chosen from each cultivar in each replication measured at maximum end and their breadth was recorded in centimetres.

#### Deel weight (g)

Using a knife, the matured fruits were separated from the pulp and a digital weighing balance was used to record

**Table 1:** Performance of off - season mango varieties for date of panicle emergence, length of panicle, width of panicle, number of flowers per panicle, duration of flowering, sex ratio.

| Treatments                        | Date of Panicle emergence | Length of Panicle (cm) | Width of Panicle (cm) | No. of flowers panicle | Duration of flowering (days) | Sex ratio          |
|-----------------------------------|---------------------------|------------------------|-----------------------|------------------------|------------------------------|--------------------|
| T <sub>1</sub> -Baramasi          | 09 April                  | 28.33 <sup>a</sup>     | 18.33 <sup>cd</sup>   | 1141.67 <sup>de</sup>  | 28.33 <sup>b</sup>           | 0.61 <sup>ab</sup> |
| T <sub>2</sub> -Thambuva          | 12 April                  | 15.33 <sup>d</sup>     | 27.33 <sup>a</sup>    | 1170.00 <sup>d</sup>   | 30.00 <sup>a</sup>           | 0.53 <sup>bc</sup> |
| T <sub>3</sub> -Tephala           | 15 April                  | 28.33 <sup>a</sup>     | 18.00 <sup>bc</sup>   | 1071.33 <sup>e</sup>   | 26.33 <sup>cd</sup>          | 0.46 <sup>c</sup>  |
| T <sub>4</sub> -Royal Special     | 22 April                  | 27.00 <sup>a</sup>     | 19.67 <sup>bc</sup>   | 1180.66 <sup>d</sup>   | 27.00 <sup>bc</sup>          | 0.51 <sup>bc</sup> |
| T <sub>5</sub> -Bobbili Punasa    | 17 April                  | 17.33 <sup>cd</sup>    | 17.00 <sup>de</sup>   | 1105.00 <sup>e</sup>   | 27.67 <sup>bc</sup>          | 0.59 <sup>bc</sup> |
| T <sub>6</sub> -Neelum            | 17 May                    | 30.00 <sup>a</sup>     | 18.33 <sup>cd</sup>   | 1402.33 <sup>b</sup>   | 23.67 <sup>ef</sup>          | 0.74 <sup>a</sup>  |
| T <sub>7</sub> -Neelum × Baneshan | 24 April                  | 22.00 <sup>b</sup>     | 16.00 <sup>e</sup>    | 1201.00 <sup>d</sup>   | 25.00 <sup>de</sup>          | 0.63 <sup>ab</sup> |
| T <sub>8</sub> -Ratna             | 28 May                    | 21.00 <sup>bc</sup>    | 21.33 <sup>b</sup>    | 1572.33 <sup>a</sup>   | 22.67 <sup>f</sup>           | 0.72 <sup>a</sup>  |
| SE(m)                             | -                         | 1.09                   | 0.44                  | 21.11                  | 0.52                         | 0.017              |
| CD at 5%                          | -                         | 3.30                   | 1.34                  | 64.03                  | 1.60                         | 0.05               |

the peel weight. Each treatment's average peel weight was determined and reported in grammes.

### Peel thickness (mm)

Digital Vernier callipers were used to measure the peel thickness and the average thickness in millimetres was calculated.

### Pulp weight (g)

The pulp weight was calculated by subtracting the weight of the fruit from the weight of the stone and peel.

### Pulp to stone ratio

For every sampling, the stone was extracted from the pulp and peel of about three fruits each replication. Weighing the pulp and stone independently in grammes allowed us to determine the pulp to stone ratio.

$$\text{Pulp to stone ratio} = \frac{\text{Total weight of pulp (g)}}{\text{Total weight of stone (g)}}$$

### Fruit Yield per plant in off season (kg)

The total fruit weight of each tree was also recorded. The average fruit weight per tree was calculated and expressed in kilogrammes.

### Total fruit yield per plant in year (kg)

Additionally, the total fruit weight of each tree was recorded during both the on- and off-seasons. The average fruit weight per tree was calculated and expressed in kilogrammes.

## Results and Discussion

### Flowering Parameters

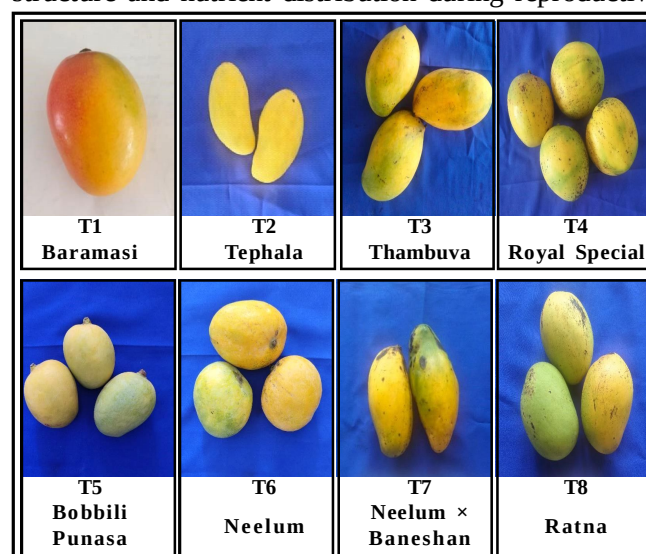
#### Panicle Emergence Date

The data presented in Table 1 showed that the earliest panicle emergence was recorded in Baramasi (9 April), while the last was observed in Ratna (28 May). Early-flowering cultivars like Baramasi are beneficial for early market supply, whereas late-flowering varieties such as

Ratna help in extending the fruiting season. This variation in panicle emergence timing may be attributed to the basic genotypic differences influencing floral induction and development rates under the prevailing environmental conditions. These findings are in close agreement with the earlier reports of Singh *et al.*, (2014) and Tiwari *et al.*, (2019).

#### Panicle Length and Width (cm)

The treatments exhibited significant variation for this parameter, as shown in Table 1 indicates that the Neelum recorded the maximum panicle length (30.00 cm), whereas the shortest panicles were observed in Thambuva (15.33 cm). Interestingly, despite its shorter panicles, Thambuva exhibited the widest panicles (27.33 cm). In contrast, cultivars such as Tephala, with comparatively shorter (28.33 cm) and narrower panicles (18.00 cm width). Variation in panicle length and breadth can be attributed to genetic variability among the cultivars, influencing the degree of floral branching, inflorescence structure and nutrient distribution during reproductive



**Plate 1:** Off season Mango varieties

**Table 2:** Performance of off- season mango varieties for number of fruits per panicle, average fruit weight, length, breadth, peel weight, average peel thickness, pulp weight, pulp to stone ratio, fruit yield per plant in off season, total fruit yield per plant in year.

| Treatments                        | NFPP                | FW                   | FL                 | FB                 | PW                  | PT                 | PWT                 | PSR                | FYPPS              | TFYPY               |
|-----------------------------------|---------------------|----------------------|--------------------|--------------------|---------------------|--------------------|---------------------|--------------------|--------------------|---------------------|
| T <sub>1</sub> -Baramasi          | 2.00 <sup>cde</sup> | 150.31 <sup>e</sup>  | 8.77 <sup>cd</sup> | 5.63 <sup>cd</sup> | 24.40 <sup>f</sup>  | 1.52 <sup>b</sup>  | 81.98 <sup>f</sup>  | 2.01 <sup>s</sup>  | 69.67 <sup>b</sup> | 75.00 <sup>b</sup>  |
| T <sub>2</sub> -Thambuva          | 1.33 <sup>e</sup>   | 480.96 <sup>ca</sup> | 14.21 <sup>a</sup> | 7.10 <sup>a</sup>  | 100.30 <sup>a</sup> | 1.94 <sup>a</sup>  | 272.80 <sup>a</sup> | 4.31 <sup>b</sup>  | 35.33 <sup>c</sup> | 39.33 <sup>d</sup>  |
| T <sub>3</sub> -Tephala           | 1.67 <sup>de</sup>  | 225.36 <sup>c</sup>  | 8.00 <sup>de</sup> | 4.86 <sup>ef</sup> | 37.92 <sup>e</sup>  | 1.21 <sup>cd</sup> | 129.73 <sup>d</sup> | 2.87 <sup>de</sup> | 22.00 <sup>d</sup> | 27.67 <sup>e</sup>  |
| T <sub>4</sub> -Royal Special     | 3.00 <sup>b</sup>   | 330.99 <sup>b</sup>  | 6.59 <sup>f</sup>  | 4.60 <sup>f</sup>  | 80.27 <sup>b</sup>  | 1.56 <sup>b</sup>  | 238.41 <sup>b</sup> | 5.59 <sup>a</sup>  | 40.33 <sup>c</sup> | 49.00 <sup>c</sup>  |
| T <sub>5</sub> -Bobbili Punasa    | 2.33 <sup>bcd</sup> | 135.43 <sup>e</sup>  | 8.43 <sup>d</sup>  | 5.69 <sup>bc</sup> | 40.55 <sup>e</sup>  | 1.33 <sup>c</sup>  | 66.96 <sup>s</sup>  | 2.45 <sup>f</sup>  | 25.33 <sup>d</sup> | 34.33 <sup>de</sup> |
| T <sub>6</sub> -Neelum            | 2.67 <sup>bc</sup>  | 185.59 <sup>d</sup>  | 7.48 <sup>ef</sup> | 6.05 <sup>b</sup>  | 53.31 <sup>d</sup>  | 1.83 <sup>a</sup>  | 78.85 <sup>i</sup>  | 3.11 <sup>d</sup>  | 42.33 <sup>c</sup> | 72.33 <sup>b</sup>  |
| T <sub>7</sub> -Neelum × Baneshan | 1.67 <sup>de</sup>  | 343.13 <sup>b</sup>  | 11.32 <sup>b</sup> | 5.26 <sup>de</sup> | 64.41 <sup>c</sup>  | 1.16 <sup>d</sup>  | 161.02 <sup>c</sup> | 3.94 <sup>c</sup>  | 23.34 <sup>d</sup> | 31.67 <sup>de</sup> |
| T <sub>8</sub> -Ratna             | 5.67 <sup>a</sup>   | 226.71               | 9.36 <sup>c</sup>  | 5.86 <sup>bc</sup> | 52.81 <sup>d</sup>  | 1.86 <sup>a</sup>  | 98.32 <sup>e</sup>  | 2.54 <sup>ef</sup> | 86.00 <sup>a</sup> | 118.33 <sup>a</sup> |
| SE(m)                             | 0.26                | 6.20                 | 0.30               | 0.13               | 2.29                | 0.04               | 2.75                | 0.11               | 2.04               | 2.58                |
| CD at 5%                          | 0.79                | 18.80                | 0.92               | 0.42               | 6.96                | 0.12               | 8.37                | 0.34               | 6.20               | 7.81                |

NFPP: Number of fruits per panicle; FW: Fruit weight (g); FL: Fruit length (cm); FB: Fruit breadth(cm);  
PW: Peel weight(g); PT: Peel thickness(mm); PWT: PulpWeight(g); PSR: Pulp to stone ratio;  
FYPPS: Fruit yield per plant in off season (kg); TFYPY: Total fruit yield per plant in year (kg)

development. These results are consistent with the earlier findings of Singh *et al.*, (2014), Indian *et al.*, (2019) and Sharma (2024).

**Number of Flowers per Panicle**

The data presented in Table 1 shown that the number of flowers per panicle was highest in Ratna (1572.33) and Neelum (1402.33), while the lowest was observed in Tephala (1071.33). This variation is largely due to genetic differences and panicle morphology with larger panicles supporting more flowers. Although more flowers generally increase the chance of fruit setactual fruiting efficiency also depends on sex ratio,pollination and environmental conditions. The present results are in agreement with the findings ofRajatiya (2018) and Indian *et al.*, (2019).

**Duration of Flowering (days)**

The data presented in Table 1 indicates that the flowering duration of the varieties ranged from 22.67 days in Ratna to 30.00 days in Thambuva. Varieties with longer flowering like Thambuva, may have higher chances of pollination. In contrast, shorter flowering in Ratna can

result in a concentrated fruit set and more uniform fruit maturity. These findings are consistent with the observations of Azam *et al.*, (2018).

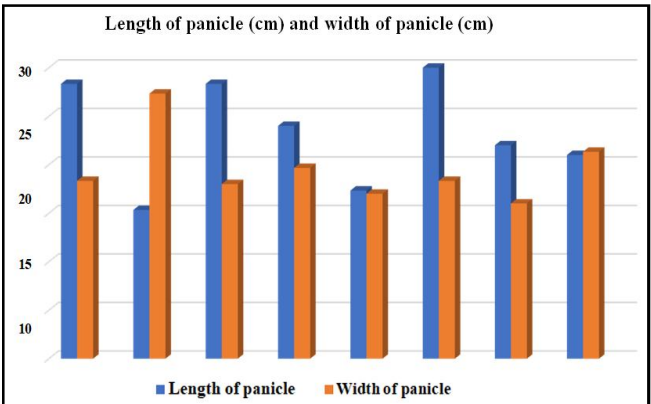
**Sex Ratio (%)**

The data presented in Table 1 indicates that the highest sex ratio was recorded in Neelum (0.74) followed by Ratna (0.72) while Tephala had the lowest (0.46). Higher sex ratios indicate a larger proportion of hermaphroditic flowers essential for fruit set. This suggests that Neelum and Ratna are superior in reproductive efficiency. These results align with the findings of Sharma *et al.*, (1998), Kanpure *et al.*, (2009) and Singh *et al.*, (2014).

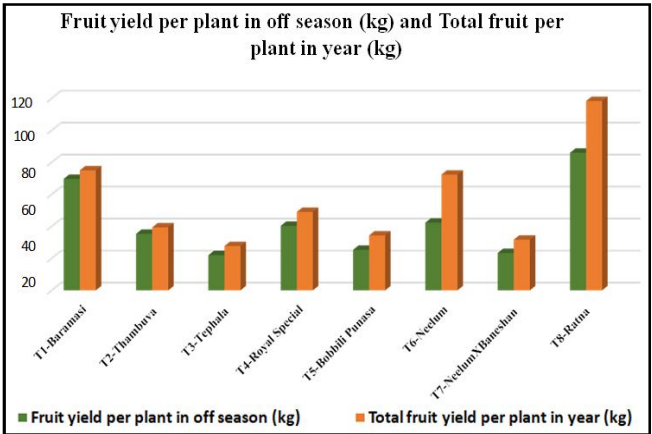
**Yield Parameters**

**Number of Fruits per Panicle**

The data presented in Table 2 indicates that Ratna recorded the highest number of fruits per panicle (5.67), reflecting its superior fruiting capacity, whereas Thambuva had the lowest (1.33). This variation highlights



**Fig. 1:** Performance of mango off season varieties for length of panicle (cm) and width of panicle (cm).



**Fig. 2:** Performance of mango off season varieties for fruit yield per plant in off season (kg) and total fruit per plant in year (kg).



the differences in fruiting potential among the cultivars. Higher flower numbers and favourable sex ratios generally contribute to better fruit set and in the case of Ratna, this combination likely supported effective pollination and fertilization. These observations are consistent with the findings of Singh *et al.*, (2014).

#### **Fruit Weight (g) and fruit length and width (cm)**

The data presented in Table 2 indicates that the Thambuva produced the heaviest fruits (480.96 g) and largest dimensions (14.21 cm length, 7.10 cm breadth). In contrast, Bobbili Punasa had the lowest fruit weight (135.43 g). The minimum fruit and breadth were observed in Royal Special (6.59 cm), followed by Neelum (7.48 cm). The similar results were also recorded by Kulkarni *et al.*, (2002) and Kumar *et al.*, (2018), Sharma (2024), Singh *et al.* (2014) Bora *et al.* (2017), Anila and Radha (2003) and Kishore *et al.*, (2015), These findings suggest that fruit size is influenced by the interaction between the genetic characteristics of cultivars and prevailing environmental conditions, resulting in considerable variation across varieties.

#### **Peel and Pulp Characteristics**

The data presented in Table 2 indicates that the Thambuva recorded the maximum peel weight (100.30 g) and pulp weight (272.80 g) whereas the minimum peel weight was observed in 'Baramasi' (24.40 g) and the lowest pulp weight in Bobbili Punasa (66.96 g). Peel thickness was highest in Thambuva (1.94 mm) and thinnest in Neelum × Baneshan (1.16 mm). A higher pulp weight along with moderate peel thickness, as observed in Thambuva, is considered desirable for table consumption. This variation in peel weight may be attributed to genetic differences among the cultivars that influence peel thickness and composition, as well as physiological factors affecting peel development during fruit growth. These results are in agreement with the findings of Singh *et al.*, (2014), Bora *et al.*, (2017), Indian *et al.*, (2019) and Sharma (2024).

#### **Pulp-to-Stone Ratio**

The data presented in Table 2 indicates that the Royal Special recorded the highest pulp-to-stone ratio (5.59), indicating a larger edible portion and better suitability for both fresh consumption and processing whereas Baramasi, with the lowest ratio (2.01) reflected a higher stone proportion making it less suitable for commercial purposes. Thus, the pulp-to-stone ratio emerges as an important trait in assessing the commercial value of mango cultivars and the present findings are in agreement with Bora *et al.*, (2017) and Mitra *et al.*, (2001).

### **Yield per Plant**

#### **Off-season Yield (kg/plant)**

The data presented in Table 2 indicates that the Ratna recorded the highest off-season yield (86.00 kg/plant) followed by Baramasi (69.67 kg/plant) while the lowest was in Tephala (22.00 kg/plant). The superior yield of Ratna may be due to its higher fruit set and favorable sex ratio, while Baramasi benefited from early and synchronized flowering. In contrast, the poor performance of Tephala could be attributed to its low sex ratio and fewer fruits per panicle, resulting in reduced productivity.

#### **Annual Yield (kg/plant)**

The data presented in Table 2 indicates that the annual yield followed a similar trend, with Ratna producing the highest yield (118.33 kg/plant), which was nearly four times greater than that of Tephala (27.67 kg/plant). The superior performance of Ratna may be attributed to its higher fruiting efficiency, greater number of fruits per panicle and favorable flowering traits, which together enhanced productivity. This clearly highlights Ratna as a promising high-yielding variety making it highly suitable for commercial off-season mango production under Central Telangana conditions.

### **Conclusion**

The present study highlighted considerable genotypic variability among off-season mango cultivars in Central Telangana with respect to both flowering and yield attributes. Among the cultivars, Neelum demonstrated particularly favorable flowering characteristics, including a higher sex ratio, which is crucial for effective fruit set and overall reproductive success. In terms of productivity, Ratna excelled in fruit number and total yield per plant, while Thambuva showed superior individual fruit size and pulp weight, indicating that different cultivars possess distinct strengths. Taking into account both yield performance and fruit quality, the cultivars Ratna, Neelum and Royal Special emerge as the most suitable choices for off-season mango production in Telangana. These cultivars not only ensure efficient flowering and high fruit set but also offer desirable fruit attributes, making them promising for both commercial cultivation and improved marketability.

### **References**

- Anila, R. and Radha T. (2003). Physico-chemical analysis of mango varieties under Kerala conditions. *Journal of Tropical Agriculture*. **41**(1/2), 20-22.
- Azam, K., Mir H., Kumar R. and Ahmad F. (2018). Study on flowering behaviour of elite mango cultivars in subtropical conditions of Bihar. *International Journal of Chemical Studies*. **6**(2), 2913-2917.

- Bora, L., Singh A.K and Singh C.P. (2017). Characterization of mango (*Mangifera indica* L.) genotypes based on physio-chemical quality attributes. *Journal of Applied and Natural Science*. **9(4)**, 2199-2204.
- Indian, G., Naik E.K., Mutharasu P., Dhanalaksmi V. and Jeeva P. (2019). Evaluation of potentiality of mango (*Mangifera indica* L.) genotypes for physical attributes of fruits. *International Journal of Chemical Studies*. **7(1)**, 1098-1102.
- Kanpure, R.N., Singh H.P. and Reja R.K. (2009). Evaluation of mango hybrids for Kymore Plateau of Madhya Pradesh. *Journal of Community Mobilization and Sustainable Development*. **4(2)**, 1-3.
- Kishore, K., Singh H.S., Kurian R.M., Srinivas P. and Samant D. (2015). Performance of certain mango varieties and hybrids in east coast of India. *Indian Journal of Plant Genetic Resources*. **28(03)**, 296-302.
- Mitra, S., Kundu S. and Mitra S.K. (2001). Evaluation of local strains of mango (*Mangifera indica* L.) grown in West Bengal. *The Indian Journal of Agricultural Sciences*. **71(7)**.
- Rajatiya, J.H. (2018). Influence of climatic parameters on flowering behaviour and pollen viability in different varieties of mango (*Mangifera indica* L.) 2558 (Doctoral dissertation, JAU, Junagadh).
- Sharma, U. (2024). Evaluation of mango (*Mangifera indica* L.) cultivars insubtropics of Himachal Pradesh Thesis (Doctoral dissertation, Dr. Yashwant Singh Parmar University of Horticulture and Forestry).
- Singh, A. (2014). Studies of morphological and physico-chemical characteristics of mango (*Mangifera indica* L.) varieties (Doctoral dissertation, GB Pant University of Agriculture and Technology, Pantnagar-263145 (Uttarakhand)).
- Tiwari, D.K., Patel V.B., Barman K., Kumar R., Verma R.B., Singh S.N. and Mishra B.B. (2019). Floral and flushing pattern of baramasi, regular and biennial bearing cultivars of mango in Eastern India. *Indian Journal of Horticulture*. **76(1)**, 38-43.