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# Enhancement and evaluation of biochemical properties of mango nectar with different concentration of guava and *Aloe vera* pulp

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**Abstract**
A lab experiment was conducted at Post harvest and Value Addition Laboratory, Mewar University Gangrar, Chittorgarh (Rajasthan) during February to May to evaluation of biochemical properties of guava syrup. The result revealed that the highest TSS was at (16.92 $^{0}$Brix), ascorbic acid (4.12 mg/100g), titratable acidity (0.34%) and total sugar (17.52%) after 60 days was recorded with $T_9$ (Arka Uday 70% + Amrapali 20% + Guava 5% + *Aloe vera* 5%). From the present investigation, it can be concluded that treatment $T_9$ (Arka Uday 70% + Amrapali 20% + Guava 5% + *Aloe vera* 5%) was the most suitable formulation for mango nectar in terms of biochemical stability. The combination of guava and *Aloe vera* significantly improved vitamin C content, TSS, pH. Hence, this treatment $T_9$ (Arka Uday 70% + Amrapali 20% + Guava 5% + *Aloe vera* 5%) is recommended for better quality of blended mango nectar.

**Keywords:** Nectar, biochemical, storage period, TSS

## Introduction
Fruits are not only important sources of nutrients but are also valued for their refreshing qua Fruits are not only important sources of nutrients but are also valued for their refreshing qualities and role in promoting good health. The commercial production of fruit beverages is a relatively recent phenomenon. Before 1930, such processing was limited and largely non-commercial. However, in subsequent decades, especially after advancements in food preservation and processing technologies, the production of fruit juices, nectars, and ready-to-serve (RTS) beverages has evolved into a well-established industry (Rahman 2017). Fruit beverages, particularly blended beverages, have become a promising area for product innovation. Blended fruit drinks are prepared by combining the pulps or juices of two or more fruits to improve nutritional, sensory, and medicinal properties. Among all fruits, mango (*Mangifera indica* L.) holds a special place due to its wide acceptability, unique aroma, and taste. The term "nectar" originates from the Greek word *néktar*, meaning “drink of the gods.” In the context of fruit beverages, nectar refers to a non-carbonated, pulp-rich drink that retains much of the fruit’s original taste, flavor, and nutrients. Fruit nectar is characterized by its smooth texture, uniform consistency, and stability, achieved through the homogenization of fruit pulp and sweeteners. Among the various fruit nectars—such as those made from guava, kokum, jamun, pineapple, custard apple, banana, citrus, pomegranate, aonla, and litchi—mango nectar stands out due to its organoleptic appeal, wide acceptability, and nutritional richness. Mango nectar is a naturally sweet, non-carbonated beverage that usually requires minimal preservation. It is rich in vitamins like A, C, and E, and provides a significant amount of dietary fiber and essential minerals. The deep orange-yellow color, combined with a distinct tropical flavor, makes mango nectar one of the most preferred beverages worldwide. It can be consumed alone or combined with other juices or functional ingredients. Guava (*Psidium guajava* L.) is another tropical fruit known for its high ascorbic acid content and distinct aroma. Similarly, *Aloe vera* (*Aloe barbadensis* Miller) has emerged as a highly functional medicinal plant with widespread applications in the cosmetic, food, and pharmaceutical industries.

Despite significant research into the preservation and processing of mango juice, there remains a gap in literature when it comes to the enrichment of mango nectar with guava and *Aloe vera*. As modern consumers increasingly demand beverages that are natural, nutritious, and possess therapeutic properties, there is a strong case for developing such blended nectar drinks as part of functional beverage innovation (Pushpendra *et al.* 2024) [12].

## 2. Materials and Methods

A lab experiment was conducted during February to May of 2024-25 at Post Harvest and Value Addition Laboratory, Department of Agriculture (Horticulture) Fruit Science, Faculty of Agriculture and Veterinary Sciences, Mewar University Gangrar, Chittorgarh (Rajasthan). The experiment was laid out in CRD (Completely Randomized Design) with eleven treatments and three replications viz; Arka Uday 100%, Amrapali 100%, Arka Uday 75% + Amrapali 25%, Arka Uday 50% + Amrapali 50%, Arka Uday 25% + Amrapali 75%, Arka Uday 70% + Amrapali 20% + Guava 10%, Arka Uday 45% + Amrapali 45% + Guava 10%, Arka Uday 20% + Amrapali 70% + Guava 10%, Arka Uday 70% + Amrapali 20% + Guava 5% + *Aloe vera* 5%, Arka Uday 45% + Amrapali 45% + Guava 5% + *Aloe vera* 5% and Arka Uday 20% + Amrapali 70% + Guava 5% + *Aloe vera* 5%. The method for biochemical properties analysis is followed standard method of particular parameters at different duration like 0, 30 and 60 days after storage.

## 3. Results and Discussion

Result revealed that the higher TSS (16.47, 17.44 and 16.92°Brix) at 0, 30 and 60 days after storage was noted in treatment $T_1$-Arka Uday 100%, and it was found to be the best treatment for maintaining higher total soluble solids in mango nectar as compared to other treatments, followed by $T_3$-Arka Uday 75% + Amrapali 25% (16.06, 16.29 and 16.69°Brix), $T_6$-Arka Uday 70% + Amrapali 20% + Guava 10% (15.81, 15.96 and 16.18°Brix), and $T_5$-Arka Uday 25% + Amrapali 75% (15.46, 15.82 and 16.02°Brix) at 0, 30 and 60 DAS, respectively. Whereas the minimum TSS (13.35, 14.29 and 15.38°Brix) at 0, 30 and 60 days after storage was noted in treatment $T_{11}$-Arka Uday 20% + Amrapali 70% + Guava 5% + *Aloe vera* 5%. Similar result also reported by Chaudhary *et al.* (2008) [4], Punam *et al.* (2009) [11], Bal *et al.* (2014) [1] and Swain *et al.* (2024) [21].

Result revealed that the higher ascorbic acid content (3.60, 3.91 and 4.12 mg/100g) at 0, 30 and 60 days after storage was noted in treatment $T_9$-Arka Uday 70% + Amrapali 20% + Guava 5% + *Aloe vera* 5%, and it was the best treatment for enhancing and retaining vitamin C content in mango nectar as compared to other treatments, followed by followed by $T_{10}$ – Arka Uday 45% + Amrapali 45% + Guava 5% + Aloe vera 5% (3.47, 3.90 and 4.11 mg/100g), $T_6$ – Arka Uday 70% + Amrapali 20% + Guava 10% (3.45, 3.82 and 4.03 mg/100g), and $T_7$ – Arka Uday 45% + Amrapali 45% + Guava 10% (3.42, 3.59 and 3.80 mg/100g) at 0, 30 and 60 DAS, respectively. Whereas the minimum ascorbic acid content (2.95, 3.17 and 3.04 mg/100 g) at 0, 30 and 60 days after storage was noted in treatment $T_2$-Amrapali 100%. Same findings also observed by Sasikumar *et al.* (2015) [16], Vijayanand *et al.*, (2015) [22] and Chaudhry *et al.* (2024) [5].

Result revealed that the higher titratable acidity (0.38, 0.36 and 0.34%) at 0, 30 and 60 days after storage was noted in treatment $T_9$-Arka Uday 70% + Amrapali 20% + Guava 5% + *Aloe vera* 5%, and it was the best treatment for maintaining higher acidity in mango nectar as compared to other treatments, followed by $T_{10}$-Arka Uday 45% + Amrapali 45% + Guava 5% + *Aloe vera* 5% (0.35, 0.33 and 0.32%), $T_6$-Arka Uday 70% + Amrapali 20% + Guava 10% (0.33, 0.32 and 0.31%), and $T_7$-Arka Uday 45% + Amrapali 45% + Guava 10% (0.32, 0.31 and 0.30%) at 0, 30 and 60 DAS, respectively. Whereas the minimum titratable acidity (0.23, 0.22 and 0.21%) at 0, 30 and 60 days after storage was recorded in treatment $T_2$-Amrapali 100%. Similar concluded with Dhiman *et al.*, (2017) [8], Kumar and Deen (2017) [10], Deokar *et al.* (2018) [7], Rafique *et al.* (2023) [13].

Result revealed that the higher total sugar content (17.16, 17.47 and 17.52%) at 0, 30 and 60 days after storage was noted in treatment $T_9$-Arka Uday 70% + Amrapali 20% + Guava 5% + *Aloe vera* 5%, and it was the best treatment for enhancing total sugar content in mango nectar as compared to other treatments, followed by $T_{10}$-Arka Uday 45% + Amrapali 45% + Guava 5% + *Aloe vera* 5% (15.53, 16.00 and 17.31%), $T_6$-Arka Uday 70% + Amrapali 20% + Guava 10% (15.32, 15.40 and 16.07%), and $T_7$-Arka Uday 45% + Amrapali 45% + Guava 10% (14.92, 15.40 and 15.92%) at 0, 30 and 60 DAS, respectively. Whereas the minimum total sugar content (13.42, 12.14 and 12.84%) at 0, 30 and 60 days after storage was recorded in treatment $T_2$-Amrapali 100%. This result also supported by Shahanas *et al.* (2019) [17], Sharma and Sharma (2019) [19], Sobhana (2019) [20] and Das *et al.* (2023) [6].

Result revealed that the highest pH value (5.00, 5.85 and 5.97) at 0, 30 and 60 days after storage was recorded in treatment $T_2$-Amrapali 100%, and it was the best treatment for maintaining higher pH in mango nectar as compared to other treatments, followed by $T_1$-Arka Uday 100% (4.81, 5.35 and 5.43), $T_5$-Arka Uday 25% + Amrapali 75% (4.61, 5.23 and 5.32), and $T_4$-Arka Uday 50% + Amrapali 50% (4.49, 5.03 and 5.11) at 0, 30 and 60 DAS, respectively. Whereas the minimum pH (3.41, 4.26 and 4.38) at 0, 30 and 60 days after storage was observed in treatment $T_9$-Arka Uday 70% + Amrapali 20% + Guava 5% + *Aloe vera* 5%. These findings also supported by Wani *et al.* (2019) [23], Bisen and Verma (2020) [2] and Bogha *et al.* (2020) [2].

**Table 1:** Effect of different treatments on the TSS, ascorbic acid and titrable acidity of mango nectar at 0, 30 and 60 DAS

| T/t | Treatments | TSS ($^0$Brix) | | | Ascorbic acid (mg/100 g) | | | Titrable acidity (%) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 DAS | 30 DAS | 60 DAS | 0 DAS | 30 DAS | 60 DAS | 0 DAS | 30 DAS | 60 DAS |
| $T_1$ | Arka Uday 100% | 16.47 | 17.44 | 16.92 | 2.95 | 3.23 | 3.44 | 0.24 | 0.23 | 0.22 |
| $T_2$ | Amrapali 100% | 15.20 | 15.31 | 15.71 | 2.95 | 3.17 | 3.38 | 0.23 | 0.22 | 0.21 |
| $T_3$ | Arka Uday 75% + Amrapali 25% | 16.06 | 16.29 | 16.69 | 3.19 | 3.36 | 3.57 | 0.27 | 0.26 | 0.25 |
| $T_4$ | Arka Uday 50% + Amrapali 50% | 15.89 | 16.06 | 15.26 | 2.98 | 3.26 | 3.47 | 0.26 | 0.25 | 0.24 |
| $T_5$ | Arka Uday 25% + Amrapali 75% | 15.46 | 15.82 | 16.02 | 2.97 | 3.24 | 3.45 | 0.25 | 0.24 | 0.23 |
| $T_6$ | Arka Uday 70% + Amrapali 20% + Guava 10% | 15.81 | 15.96 | 16.18 | 3.45 | 3.82 | 4.03 | 0.33 | 0.32 | 0.31 |
| $T_7$ | Arka Uday 45% + Amrapali 45% + Guava 10% | 15.27 | 15.66 | 15.92 | 3.42 | 3.59 | 3.80 | 0.32 | 0.31 | 0.30 |
| $T_8$ | Arka Uday 20% + Amrapali 70% + Guava 10% | 14.99 | 15.27 | 15.45 | 3.23 | 3.44 | 3.65 | 0.29 | 0.27 | 0.26 |
| $T_9$ | Arka Uday 70% + Amrapali 20% + Guava 5% + *Aloe vera* 5% | 15.28 | 15.81 | 15.99 | 3.60 | 3.91 | 4.12 | 0.38 | 0.36 | 0.34 |
| $T_{10}$ | Arka Uday 45% + Amrapali 45% + Guava 5% + *Aloe vera* 5% | 15.09 | 15.38 | 15.55 | 3.47 | 3.90 | 4.11 | 0.35 | 0.33 | 0.32 |
| $T_{11}$ | Arka Uday 20% + Amrapali 70% + Guava 5% + *Aloe vera* 5% | 13.35 | 14.29 | 15.38 | 3.35 | 3.51 | 3.72 | 0.30 | 0.28 | 0.27 |
| | S. Em.± | 0.27 | 0.22 | 0.15 | 0.05 | 0.06 | 0.08 | 0.01 | 0.01 | 0.01 |
| | CD (5%) | 0.80 | 0.64 | 0.44 | 0.15 | 0.18 | 0.23 | 0.03 | 0.02 | 0.03 |

**Table 2:** Effect of different treatments on the total sugar and pH of mango nectar at various storage intervals

| T/t | Treatments | Total sugar (%) | | | pH | | |
|---|---|---|---|---|---|---|---|
| | | 0 DAS | 30 DAS | 60 DAS | 0 DAS | 30 DAS | 60 DAS |
| $T_1$ | Arka Uday 100% | 13.74 | 13.73 | 13.81 | 4.81 | 5.35 | 5.43 |
| $T_2$ | Amrapali 100% | 13.42 | 12.14 | 12.84 | 5.00 | 5.85 | 5.97 |
| $T_3$ | Arka Uday 75% + Amrapali 25% | 14.39 | 14.61 | 15.33 | 4.35 | 4.99 | 5.08 |
| $T_4$ | Arka Uday 50% + Amrapali 50% | 14.10 | 14.56 | 14.71 | 4.49 | 5.03 | 5.11 |
| $T_5$ | Arka Uday 25% + Amrapali 75% | 14.02 | 14.27 | 14.50 | 4.61 | 5.23 | 5.32 |
| $T_6$ | Arka Uday 70% + Amrapali 20% + Guava 10% | 15.32 | 15.40 | 16.07 | 3.64 | 4.46 | 4.58 |
| $T_7$ | Arka Uday 45% + Amrapali 45% + Guava 10% | 14.92 | 15.40 | 15.92 | 3.86 | 4.60 | 4.71 |
| $T_8$ | Arka Uday 20% + Amrapali 70% + Guava 10% | 14.61 | 14.91 | 15.34 | 4.13 | 4.78 | 4.87 |
| $T_9$ | Arka Uday 70% + Amrapali 20% + Guava 5% + *Aloe vera* 5% | 17.16 | 17.47 | 17.52 | 3.41 | 4.26 | 4.38 |
| $T_{10}$ | Arka Uday 45% + Amrapali 45% + Guava 5% + *Aloe vera* 5% | 15.53 | 16.00 | 17.31 | 3.53 | 4.26 | 4.36 |
| $T_{11}$ | Arka Uday 20% + Amrapali 70% + Guava 5% + *Aloe vera* 5% | 14.65 | 15.27 | 15.42 | 4.00 | 4.73 | 4.83 |
| | S. Em.± | 0.15 | 0.24 | 0.34 | 0.08 | 0.11 | 0.14 |
| | CD (5%) | 0.44 | 0.70 | 0.98 | 0.22 | 0.31 | 0.41 |

## Conclusion

From the present investigation, it can be concluded that treatment $T_9$ (Arka Uday 70% + Amrapali 20% + Guava 5% + *Aloe vera* 5%) was the most suitable formulation for mango nectar in terms of biochemical stability. The combination of guava and *Aloe vera* significantly improved vitamin C content, TSS, pH. Hence, this treatment $T_9$ (Arka Uday 70% + Amrapali 20% + Guava 5% + *Aloe vera* 5%) is recommended for better quality of blended mango nectar.

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