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Recipe standardization and sensory evaluation of fortified Aonla nectar

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Abstract

Aonla is a minor sub-tropical deciduous fruit, which belongs to the family Euphorbiaceae. Aonla is a rich source of vitamin C next to barbadose cherry. It also contains vitamin A, vitamin B, iron, phosphorus, polyphenols and tannins in ample amount. Due to high astringency, aonla fruits are generally not preferred for fresh consumption, therefore, processing of aonla in to various value-added products such as RTS, nectar, squash, candy, preserve, jam and chyavanprash is the best alternative. The present investigation “Recipe standardization and sensory evaluation of fortified aonla nectar” was conducted at the Horticulture Processing Laboratory, Department of Fruit Science, IGKV, Raipur (C.G) during the year 2021-2022. The research trial was carried out in Completely Randomized Design with 13 treatments combinations and 3 replications. Results with reference to sensory evaluation of fortified Aonla nectar unveiled that the treatment T₁₁ (50% Aonla + 48% Pomegranate + 2% Ginger) recorded maximum score for all the parameters i.e. colour/appearance, taste, flavor, aroma & overall acceptability. However, the minimum score for all the sensory parameters was registered under the treatment T₁₃ (100% Aonla).

Keywords: Astringency, fortified, organoleptic, nectar & standardization

Introduction

One of the most important and nutritious fruit, which is used as a cure of many ailments is Aonla (*Emblica officinalis* Gaertn). Aonla is a minor sub-tropical deciduous fruit, which belongs to the family Euphorbiaceae. It can be grown in wide range of climatic condition because of its hardy nature. Aonla is a rich source of vitamin C next to barbadose cherry. It also contains vitamin A, vitamin B, iron, phosphorus, polyphenols and tannins in ample amount. Aonla is used as a medicine for many ailments such as diabetes, cough, diarrhoea, dysentery & hemorrhages. In India, aonla is available for a brief period, from October to January. Due to high astringency, aonla fruits are generally not preferred for fresh consumption and being perishable in nature it cannot be stored for longer period. Therefore, processing of aonla in to various value-added products such as RTS, nectar, squash, candy, preserve, jam and chyavanprash is the best alternative to avoid market glut and wastage of fruits.

Now-a-days blending of various fruit juices are preferred to nutritionally enrich the products and to balance flavor, acidity, bitterness & astringency. Therefore, the present research study has been carried out in the Horticulture Processing Laboratory, Department of Fruit Science, IGKV, Raipur (C.G) during the year 2021-2022 to standardize the recipe of fortified aonla nectar and study the effect of storage period on sensory parameters of blended nectar.

Methods and Materials

The present investigation “Recipe standardization and sensory evaluation of fortified aonla nectar” was conducted at the Horticulture Processing Laboratory, Department of Fruit Science, IGKV, Raipur (C.G) during the year 2021-2022. The research trial was carried out in Completely Randomized Design with 13 treatments combinations and 3 replications. For the preparation of fortified Aonla nectar, uniformly matured, healthy and diseases free Aonla fruits were procured from the local market. The fruits which were used for fortification of nectar i.e. pomegranate, mandarin and ginger were also purchased from the market. These fruits were washed thoroughly with water and then were crushed in mixer grinder for the extraction of juice. After extraction of juice from the selected fruits, the total soluble solids and acidity present in the fruit juice were first recorded and then accordingly sugar and citric acid was added to maintain 15% TSS and 0.3% acidity in aonla based fortified nectar. Further, sugar syrup was prepared, and when the sugar completely dissolved in the water, citric acid was

added. This sugar syrup was strained using muslin cloth, followed by addition of fruit juices. This mixture was cooked until it reaches the TSS of 15 °Brix. The processed nectar was filled hot in the sterilized glass bottles leaving head space of 1.5-2 cm. The bottles were then sealed using corking machine and were stored in ambient condition. The resulting aonla based fortified nectar were tasted by the panel of judges and were evaluated for various sensory parameters *i.e.* colour / appearance, taste, flavor, aroma & overall acceptability using 9-point Hedonic scale as developed by Gupta (1999) [2].

Results and Discussion

The observations pertaining to various sensory parameters of fortified aonla nectar are discussed as follows:

Sensory evaluation of fortified Aonla nectar

In the present research study, the sensory parameters of fortified Aonla nectar *i.e.* colour/appearance, taste, flavor, aroma and overall acceptability were examined by the panel of judges at 0, 30, 60 & 90 days after processing.

Colour/Appearance

The data with reference to organoleptic scores for colour/appearance during the experimental year 2021-2022 is displayed in the Table 1. It is revealed from the experimental finding that there was downtrend in the organoleptic scores for colour/appearance in various treatments during the storage period. During the initial stage of storage, the organoleptic scores for colour varied from 4.72 to 9.00, while at the end of storage period it was 2.95 to 6.63. At 0 DAP, the maximum score for colour/appearance (9.00) was obtained in T₁₁ (50% Aonla + 48% Pomegranate + 2% Ginger) which was found

significantly dominant among all other treatments. Furthermore, the treatments T₁₀ & T₈ and T₄, T₅ & T₁₂ with scores 8.62 & 8.65 and 7.67, 7.75 & 7.97 respectively were found statistically similar with each other at 5% level of significance. The minimum score (4.72) was allotted to the treatment T₁₃ (100% Aonla) which was significantly different from rest of the treatments. At 30 DAP, the data presented in the Table 1 indicates that the treatment T₁₁ gained maximum score (8.29) with respect to colour/ appearance, which was found statistically *at par* with T₁₀ & T₈ having respective scores of 7.88 & 7.97. The minimum score (4.31) was given to the treatment T₁₃. At 60 DAP, the maximum score for colour/appearance (7.63) was obtained in T₁₁ which was found to be *statistically at par* with T₁₀ & T₈ having respective scores of 7.38 & 7.45. Likewise, the treatments T₄, T₅ & T₁₂ and T₂ & T₃ with scores 6.42, 6.67 & 6.70 and 4.64 & 4.70 respectively were marked non-significant differences with each other at 5% level of significance. The minimum score (3.84) was allotted to the treatment T₁₃. At 90 DAP, T₁₁ was found to be pre-eminence over rest of the treatments. The highest score for colour was registered under the treatment T₁₁ (6.63), while the minimum score was tapped under T₁₃ (2.95). Thus, it is concluded from the above findings that T₁₁ registered maximum organoleptic score at 0, 30, 60 & 90 days after processing for colour/appearance, however, decreasing trend was noticed in the scores, this might be due to the oxidation of phenols which leads to degradation of colour or non-enzymatic reaction of organic acid with sugar. Similar observations were also enrolled by Choudhary *et al.* (2012) [1] and Purander *et al.* (2013) [8] in aonla nectar.

Table 1: Changes in organoleptic score for colour/ appearance of fortified aonla nectar during storage

Treatments	0 DAP	30 DAP	60 DAP	90 DAP
T ₁ (25% Aonla +75% Mandarin)	6.39 ^c	5.88 ^c	5.33 ^c	4.20 ^b
T ₂ (50% Aonla +50% Mandarin)	5.50 ^b	5.04 ^b	4.64 ^b	3.78 ^b
T ₃ (75% Aonla +25% Mandarin)	5.76 ^b	5.13 ^b	4.70 ^b	3.60 ^b
T ₄ (25% Aonla + 75% Pomegranate)	7.67 ^d	7.06 ^d	6.42 ^d	4.96 ^c
T ₅ (50% Aonla + 50% Pomegranate)	7.75 ^d	7.05 ^d	6.67 ^d	5.24 ^{cde}
T ₆ (75% Aonla + 25% Pomegranate)	6.46 ^c	5.95 ^c	5.36 ^c	4.16 ^b
T ₇ (25% Aonla + 73% Mandarin + 2% Ginger)	6.21 ^c	5.84 ^c	5.31 ^c	4.17 ^b
T ₈ (50% Aonla + 48% Mandarin + 2% Ginger)	8.65 ^e	7.97 ^e	7.45 ^e	5.85 ^e
T ₉ (75% Aonla + 23% Mandarin + 2% Ginger)	6.37 ^c	5.81 ^c	5.36 ^c	4.16 ^b
T ₁₀ (25% Aonla + 73% Pomegranate + 2% Ginger)	8.62 ^e	7.88 ^e	7.38 ^e	5.75 ^{de}
T ₁₁ (50% Aonla + 48% Pomegranate + 2% Ginger)	9.00 ^f	8.29 ^e	7.63 ^e	6.63 ^f
T ₁₂ (75% Aonla + 23% Pomegranate + 2% Ginger)	7.97 ^d	7.27 ^d	6.70 ^d	5.19 ^{cd}
T ₁₃ (100% Aonla)	4.72 ^a	4.31 ^a	3.84 ^a	2.95 ^a
SE (m) ±	0.11	0.14	0.12	0.21
CD at 5%	0.33	0.41	0.34	0.62

*DAP- Days after processing

*The superscript letter indicates that the treatment means with same letters are at par at 5% level of significance, while the means with different letters are significantly different at 5% level of significance. These letters have been affixed based on CD- value comparison of treatment means.

Taste

The perusals of data assembled on organoleptic scores for taste is presented in the Table 2. At 0 DAP, the maximum score for taste (8.76) was indexed in T₁₁ (50% Aonla + 48% Pomegranate + 2% Ginger) which was found significantly supremacy among all other treatments. Furthermore, the treatments T₁₀ & T₈ and T₃, T₂, T₅, T₉, T₁₂ & T₇ with respective taste scores 8.29 & 8.41 and 6.67, 6.75, 6.81, 6.82, 6.82 & 6.96 were found statistically identical with each other at 5% level of significance. The minimum taste score (4.33)

was given to the treatment T₁₃ (100% Aonla) which was significantly different from rest of the other treatments. At 30 DAP, the treatment T₁₁ (50% Aonla + 48% Pomegranate + 2% Ginger) enrolled the maximum taste score (8.26), followed by treatments T₈ & T₁₀ having respective scores of 7.93 & 7.82. T₁₃ (100% Aonla) perceived minimal taste score (4.08), which was significantly different from rest of the treatments. At 60 DAP, the maximum score for taste (7.48) was explored in T₁₁ (50% Aonla + 48% Pomegranate + 2% Ginger) which was found to be statistically at par with T₁₀ &

T₈ having respective scores of 7.24 & 7.23. In addition, the treatments T₆, T₃, T₄, T₁₂, T₉, T₁ & T₅ with respective scores 5.53, 5.73, 5.83, 5.84, 5.90, 5.91 & 5.92 were remarked non-significant differences with each other at 5% level of significance. The minimum score (3.70) was given to the treatment T₁₃ (100% Aonla) which was significantly different from rest of the treatments. The Table 2 clearly indicates that at 90 DAP, the maximum taste score (7.00) was documented under the treatment T₁₁, which was marked significantly dominant over rest of the treatments. However, the minimum score (3.63)

was tapped under T₁₃, which was observed significantly different from rest of the treatments. There was sharp decrease in the organoleptic scores for taste in various treatments during the storage period at ambient condition, this might be due to the production of off taste in nectar as a result of certain bio-chemical changes taking place under high temperature. Similar findings were also reported by Satish *et al.* (2009) [6], Choudhary *et al.* (2012) [1] and Purander *et al.* (2013) [8] in aonla nectar.

Table 2: Changes in organoleptic score for taste of fortified aonla nectar during storage

Treatments	0 DAP	30 DAP	60 DAP	90 DAP
T ₁ (25% Aonla +75% Mandarin)	6.55 ^{bc}	6.19 ^{bc}	5.91 ^{bcd}	4.94 ^{de}
T ₂ (50% Aonla +50% Mandarin)	6.75 ^{bcd}	6.37 ^{bc}	5.99 ^{cd}	5.00 ^e
T ₃ (75% Aonla +25% Mandarin)	6.67 ^{bcd}	6.29 ^{bc}	5.73 ^{bc}	4.79 ^c
T ₄ (25% Aonla + 75% Pomegranate)	6.59 ^{bc}	6.22 ^{bc}	5.83 ^{bcd}	4.87 ^{cd}
T ₅ (50% Aonla + 50% Pomegranate)	6.81 ^{cd}	6.42 ^{bc}	5.92 ^{bcd}	4.95 ^{de}
T ₆ (75% Aonla + 25% Pomegranate)	6.45 ^b	6.08 ^b	5.53 ^b	4.62 ^b
T ₇ (25% Aonla + 73% Mandarin + 2% Ginger)	6.96 ^d	6.56 ^c	6.20 ^d	5.18 ^f
T ₈ (50% Aonla + 48% Mandarin + 2% Ginger)	8.41 ^e	7.93 ^d	7.23 ^e	6.04 ^g
T ₉ (75% Aonla + 23% Mandarin + 2% Ginger)	6.82 ^{cd}	6.43 ^{bc}	5.90 ^{bcd}	4.93 ^{de}
T ₁₀ (25% Aonla + 73% Pomegranate + 2% Ginger)	8.29 ^e	7.82 ^d	7.24 ^e	6.05 ^g
T ₁₁ (50% Aonla + 48% Pomegranate + 2% Ginger)	8.76 ^f	8.26 ^d	7.48 ^e	7.00 ^h
T ₁₂ (75% Aonla + 23% Pomegranate + 2% Ginger)	6.82 ^{cd}	6.43 ^{bc}	5.84 ^{bcd}	4.88 ^d
T ₁₃ (100% Aonla)	4.33 ^a	4.08 ^a	3.70 ^a	3.44 ^a
SE (m) ±	0.11	0.16	0.15	0.03
CD at 5%	0.33	0.47	0.45	0.09

*DAP- Days after processing

*The superscript letter indicates that the treatment means with same letters are at par at 5% level of significance, while the means with different letters are significantly different at 5% level of significance. These letters have been affixed based on CD- value comparison of treatment means.

Flavour

The data regarding organoleptic scores for flavour during the experimental year 2021-2022 is presented in the Table 3. It is evident from the research trial that at 0 DAP, the topmost score for flavour (8.82) was listed in the treatment T₁₁ (50% Aonla + 48% Pomegranate + 2% Ginger) which was found significantly supreme among all other treatments. Furthermore, the treatments T₂ & T₆; T₉, T₈ & T₁₀ and T₆, T₅ & T₇ with respective flavour scores 6.76 & 7.05; 7.78, 7.93 & 8.10 and 7.05, 7.19 & 7.21 were found statistically alike with each other at 5% level of significance. The least score for flavour (5.25) was given to the treatment T₁₃ (100% Aonla) which was significantly different from rest of the other treatments. At 30 DAP, the treatment T₁₁ enrolled the topmost flavour score (8.32), followed by treatments T₁₀ & T₈ having respective scores of 7.64 & 7.49. T₁₃ perceived minimum flavour score (4.96), which was significantly different from rest of the treatments. At 60 DAP, the maximum score for flavour (7.72) was explored in T₁₁ which was significantly

superior among other treatments. The minimum score (4.60) was given to the treatment T₁₃. At 90 DAP, the treatment T₁₁ displayed significant supremacy over rest of the treatments by scoring highest flavour score (6.45). However, the minimum score (4.27) was reported under T₁₃, which was observed significantly different from rest of the treatments. Additionally, the treatments T₈, T₁₂ & T₉ and T₆ & T₅ having respective flavour score of 5.61, 5.66 & 5.69 and 5.16 & 5.26 which were found statistically equivalent at 5% level of significance. It is disclosed from the experimental result of organoleptic flavour scores for aonla based fortified nectar that the flavour score declined with the advancement of storage period, this might be due to the fact that certain bio-chemical changes occurs under low pH and high temperature that leads to production of off-flavour in the nectar. Similar observations were also recorded by Satish *et al.* (2009) [6], Choudhary *et al.* (2012) [1], Purander *et al.* (2013) [8], Patel *et al.* (2016) [4] and Lalit *et al.* (2014) [3].

Table 3: Changes in Organoleptic score for Flavour of Fortified Aonla Nectar during storage

Treatments	0 DAP	30 DAP	60 DAP	90 DAP
T ₁ (25% Aonla +75% Mandarin)	6.58 ^c	6.21 ^{bcd}	5.76 ^{bcd}	4.81 ^c
T ₂ (50% Aonla +50% Mandarin)	6.76 ^{cd}	6.38 ^{bcd}	5.92 ^{cde}	4.94 ^d
T ₃ (75% Aonla +25% Mandarin)	6.49 ^{bc}	6.12 ^{bc}	5.68 ^{bc}	4.74 ^c
T ₄ (25% Aonla + 75% Pomegranate)	6.18 ^b	5.83 ^b	5.41 ^b	4.52 ^b
T ₅ (50% Aonla + 50% Pomegranate)	7.19 ^e	6.78 ^{de}	6.29 ^{ef}	5.26 ^{ef}
T ₆ (75% Aonla + 25% Pomegranate)	7.05 ^{de}	6.66 ^{cd}	6.17 ^{de}	5.16 ^e
T ₇ (25% Aonla + 73% Mandarin + 2% Ginger)	7.21 ^e	6.80 ^{de}	6.31 ^{efg}	5.27 ^f
T ₈ (50% Aonla + 48% Mandarin + 2% Ginger)	7.93 ^{fg}	7.49 ^f	6.71 ^{gh}	5.61 ^g
T ₉ (75% Aonla + 23% Mandarin + 2% Ginger)	7.78 ^{fg}	7.34 ^{ef}	6.81 ^h	5.69 ^g

T ₁₀ (25% Aonla + 73% Pomegranate + 2% Ginger)	8.10 ^g	7.64 ^f	7.08 ^h	5.92 ^h
T ₁₁ (50% Aonla + 48% Pomegranate + 2% Ginger)	8.82 ^h	8.32 ^g	7.72 ⁱ	6.45 ⁱ
T ₁₂ (75% Aonla + 23% Pomegranate + 2% Ginger)	7.74 ^f	7.31 ^{ef}	6.77 ^{gh}	5.66 ^g
T ₁₃ (100% Aonla)	5.25 ^a	4.96 ^a	4.60 ^a	4.27 ^a
SE (m) ±	0.11	0.21	0.16	0.04
CD at 5%	0.32	0.61	0.46	0.1

*DAP- Days after processing

*The superscript letter indicates that the treatment means with same letters are at par at 5% level of significance, while the means with different letters are significantly different at 5% level of significance. These letters have been affixed based on CD- value comparison of treatment means.

Aroma

The data pertaining to organoleptic scores for aroma during the experimental year 2021-2022 is presented in the Table 4. It is revealed from the research trial that at 0 DAP, the maximum score for aroma (9.00) was obtained in T₁₁ (50% Aonla + 48% Pomegranate + 2% Ginger) which was statistically *at par* with T₁₀ (8.66) at 5% level of significance. Furthermore, the treatments T₆ & T₃ and T₂, T₇ & T₉ with scores 5.57 & 5.96 and 6.78, 6.99 & 7.02 respectively were found statistically similar with each other at 5% level of significance. The minimum score (5.16) was allotted to the treatment T₁₃ (100% Aonla) which was statistically equivalent with T₁ (5.21) at 5% level of significance. At 30 DAP, the data highlighted in the Table 4 indicates that the treatment T₁₁ gained maximum score (8.49) with respect to aroma, which was found statistically *at par* with T₁₀ (8.16) at 5% level of significance. The minimum score (4.87) was given to the treatment T₁₃ which was statistically equivalent with T₁ & T₆ having respective scores 4.92 & 5.25 at 5% level of significance. The result obtained at 60 DAP, showed that the

maximum score for aroma (7.72) was obtained in T₁₁ which was found to be significant pre-eminence over rest of the treatments. The second highest aroma score (7.08) was marked under the treatment T₁₀ which was statistically at par with T₈ having aroma score of 6.84. The minimum score (4.43) was allotted to the treatment T₁₃ which was found statistically similar with the treatments T₁ (4.50) & T₆ (4.65) at 5% level of significance. At 90 DAP, T₁₁ was found to be pre-eminence over rest of the treatments. The highest score for aroma was registered under the treatment T₁₁ (6.45), while the minimum score was tapped under T₁₃ (3.76). The reason behind gradual decrease in sensory scores for aroma of aonla based fortified nectar during storage period might be due to continuous loss or modification of many chemical constituents of the product. These results corroborate with the various findings in aonla and its blended nectar Choudhary *et al.* (2012) [1] and Purander *et al.* (2013) [8], Lalit *et al.* (2014) [3] in guava nectar and Yadav (2015) [7] in carrot- aonla juice blended nectar.

Table 4: Changes in Organoleptic score for Aroma of Fortified Aonla Nectar during storage

Treatments	0 DAP	30 DAP	60 DAP	90 DAP
T ₁ (25% Aonla + 75% Mandarin)	5.21 ^{ab}	4.92 ^a	4.50 ^a	4.12 ^c
T ₂ (50% Aonla + 50% Mandarin)	6.78 ^e	6.40 ^{de}	5.87 ^{cd}	4.91 ^g
T ₃ (75% Aonla + 25% Mandarin)	5.96 ^{cd}	5.63 ^{bc}	5.15 ^b	4.30 ^d
T ₄ (25% Aonla + 75% Pomegranate)	6.20 ^d	5.86 ^{cd}	5.32 ^b	4.45 ^e
T ₅ (50% Aonla + 50% Pomegranate)	6.35 ^d	5.99 ^{cd}	5.50 ^{bc}	4.60 ^f
T ₆ (75% Aonla + 25% Pomegranate)	5.57 ^{bc}	5.25 ^{ab}	4.65 ^a	3.89 ^b
T ₇ (25% Aonla + 73% Mandarin + 2% Ginger)	6.99 ^{ef}	6.60 ^e	6.10 ^{de}	5.10 ^h
T ₈ (50% Aonla + 48% Mandarin + 2% Ginger)	8.25 ^g	7.78 ^f	6.84 ^{fg}	5.72 ^j
T ₉ (75% Aonla + 23% Mandarin + 2% Ginger)	7.02 ^{ef}	6.63 ^e	6.11 ^{de}	5.11 ^h
T ₁₀ (25% Aonla + 73% Pomegranate + 2% Ginger)	8.66 ^h	8.16 ^{fg}	7.08 ^g	5.92 ^k
T ₁₁ (50% Aonla + 48% Pomegranate + 2% Ginger)	9.00 ^h	8.49 ^g	7.72 ^h	6.45 ^l
T ₁₂ (75% Aonla + 23% Pomegranate + 2% Ginger)	7.27 ^f	6.86 ^e	6.47 ^{ef}	5.41 ⁱ
T ₁₃ (100% Aonla)	5.16 ^a	4.87 ^a	4.43 ^a	3.76 ^a
SE (m) ±	0.14	0.2	0.15	0.03
CD at 5%	0.4	0.6	0.43	0.1

*DAP- Days after processing

*The superscript letter indicates that the treatment means with same letters are at par at 5% level of significance, while the means with different letters are significantly different at 5% level of significance. These letters have been affixed based on CD- value comparison of treatment means.

Overall acceptability

The data pertaining to organoleptic scores for overall acceptability during the experimental year 2021-2022 is presented in the Table 5. At 0 DAP, the maximum score (8.85) was indexed in T₁₁ (50% Aonla + 48% Pomegranate + 2% Ginger) which displayed supremacy among all other treatments. Furthermore, the treatments T₈ & T₁₀ and T₇, T₅, T₁₂ & T₉ with respective scores 8.08 & 8.40 and 7.42, 7.52, 7.55 & 7.66 were found statistically identical with each other at 5% level of significance. The least score for overall acceptability (5.91) was given to the treatment T₁₃ (100% Aonla) which was significantly different from rest of the other

treatments. At 30 DAP, the treatment T₁₁ enrolled the topmost score (8.35) which was statistically *at par* with T₁₀ having score of 7.92. T₁₃ perceived minimal score (5.58), which was found significantly similar with T₃ (6.16) at 5% level of significance. At 60 DAP, the maximum score for (7.72) was explored in T₁₁ which was found to be statistically *at par* with T₈ having score of 7.63. The minimum score (5.15) was given to the treatment T₁₃ (100% Aonla) which was significantly different from rest of the treatments. At 90 DAP, the highest score (6.45) was documented under the treatment T₁₁, which was followed by treatments T₈ (6.38), T₁₀ (5.86) and T₉ (5.58). However, the minimum score (4.75) was tapped under

T₁₃, which was significantly similar with T₃ (4.79) at 5% level of significance. There was sharp decrease in the organoleptic scores for overall acceptability in various treatments during the storage period at ambient condition, the major reason behind declining of organoleptic scores with advancement in storage period is production of off taste & flavour in nectar as well as discolouration as a result of certain bio- chemical

changes taking place under high temperature. It ultimately results in masking of original taste, flavour and colour of the product. These findings were in close agreement with the findings of Satish *et al.* (2009) [6], Choudhary *et al.* (2012) [11] and Purander *et al.* (2013) [8] in aonla nectar.

Table 5: Changes in Organoleptic score for Overall acceptability of Fortified Aonla Nectar during storage

Treatments	0 DAP	30 DAP	60 DAP	90 DAP
T ₁ (25% Aonla +75% Mandarin)	6.92 ^{bc}	6.53 ^{bcd}	6.03 ^{bcd}	5.04 ^{bc}
T ₂ (50% Aonla +50% Mandarin)	7.22 ^{cde}	6.82 ^{bcd}	6.30 ^{cdef}	5.26 ^d
T ₃ (75% Aonla +25% Mandarin)	6.52 ^b	6.16 ^{ab}	5.69 ^b	4.79 ^a
T ₄ (25% Aonla + 75% Pomegranate)	7.00 ^{cd}	6.61 ^{bcd}	6.10 ^{bcd}	5.10 ^c
T ₅ (50% Aonla + 50% Pomegranate)	7.52 ^{ef}	7.10 ^{cdef}	6.55 ^{efg}	5.48 ^{ef}
T ₆ (75% Aonla + 25% Pomegranate)	6.81 ^{bc}	6.42 ^{bc}	5.93 ^{bc}	4.96 ^b
T ₇ (25% Aonla + 73% Mandarin + 2% Ginger)	7.42 ^{def}	7.00 ^{cdef}	6.46 ^{def}	5.40 ^e
T ₈ (50% Aonla + 48% Mandarin + 2% Ginger)	8.08 ^{gh}	7.63 ^{fg}	7.63 ^h	6.38 ^h
T ₉ (75% Aonla + 23% Mandarin + 2% Ginger)	7.66 ^{fg}	7.23 ^{ef}	6.68 ^{fg}	5.58 ^f
T ₁₀ (25% Aonla + 73% Pomegranate + 2% Ginger)	8.40 ^h	7.92 ^{gh}	7.01 ^g	5.86 ^g
T ₁₁ (50% Aonla + 48% Pomegranate + 2% Ginger)	8.85 ⁱ	8.35 ^h	7.72 ^h	6.45 ^h
T ₁₂ (75% Aonla + 23% Pomegranate + 2% Ginger)	7.55 ^{ef}	7.12 ^{def}	6.58 ^{fg}	5.50 ^{ef}
T ₁₃ (100% Aonla)	5.91 ^a	5.58 ^a	5.15 ^a	4.75 ^a
SE (m) ±	0.15	0.23	0.16	0.04
CD at 5%	0.43	0.68	0.47	0.11

*DAP- Days after processing

*The superscript letter indicates that the treatment means with same letters are at par at 5% level of significance, while the means with different letters are significantly different at 5% level of significance. These letters have been affixed based on CD- value comparison of treatment means.

Conclusions

Evaluation of 13 treatments of fortified aonla nectar for various sensory parameters during the experimental year 2021-2022 revealed that the treatment T₁₁ (50% Aonla + 48% Pomegranate + 2% Ginger) was found excellent among all other treatments, while the treatment T₁₃ (100% Aonla) recorded minimum organoleptic scores for all the parameters.

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