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Determination of ideal sweetness level and nutritional and sensory properties of *Spondias mombin* juice

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Introduction & Aim

Spondias mombin L., also known as hog plum fruit, is native to the tropical areas of America and has been naturalized in Africa. Its juice is rarely consumed despite its nutritional benefits. This could be due to the sour taste of the fruit. Sweetening sour juices improves their acceptability; however, the level of sweetness required for this juice has not been previously reported. Thus, this study sought to determine the optimum sweetness level to encourage the juice's consumption and to assess its nutritional and sensory properties

Method

Hog plum juice was produced following the flow chart in Figure 1 and was sweetened with sucrose and artificial sweeteners: sucralose, aspartame, acesulfame K, saccharin, and stevia. The ideal sweetness of the sucrose-sweetened juice was determined by 60 assessors using the Just About Right scale. The equivalent sweetness levels of the sweeteners were assessed through the magnitude estimation method by 12 pre-selected tasters; this offers a measure of perceived sweetness intensity. The sweetened juices were then analyzed for their nutritional and sensory properties following standard procedures

Results

Table 1: Equivalent concentration and sweetness potency of the hog plum juice compared to the reference sample- 9.95g/100 ml of sucrose

Sweetener	Equivalent concentration (g/100ml)	Sweetness potency (times)
Sucralose	0.0186	535
Acesulfame-K	0.0316	315
Stevia	0.1157	86
Saccharin	0.0316	315
Aspartame	0.0580	171.62

Table 2: Proximate composition of sweetened hog plum juice

	Moisture (%)	Protein (%)	Fat (%)	Fiber (%)	Ash (%)	Carbohydrate (%)
Sucrose	85.54[a]	0.75[ab]	0.06	0.02	0.03[a]	13.60[d]
Sucralose	94.46[c]	1.03[c]	0.01	0.03	0.03[a]	4.45[a]
Stevia	94.46[c]	0.76[b]	0.03	0.02	0.06[b]	4.67[b]
Aspartame	94.48[c]	0.72[a]	0.03	0.02	0.03[a]	4.71[b]
Saccharin	94.33[b]	0.71[a]	0.04	0.02	0.03[a]	4.87[c]
Acesulfame K	94.55[d]	0.71[a]	0.03	0.01	0.03[a]	4.67[b]

Different superscript indicate values within the column are significantly different at P<0.05 according to LSD

Table 3: Antioxidant content of sweetened hog plum juice

	Phenol (mg/ml)	Flavonoid (mg/ml)	Vitamin C (mg/100ml)	Beta-Carotene (mg/100ml)
Sucrose	1.11[b]	1.03[b]	8.13[a]	0.70[a]
Sucralose	0.84[a]	0.86[a]	7.63[a]	0.99[a]
Stevia	1.01[ab]	1.04[b]	10.02[b]	0.78[a]
Aspartame	0.87[a]	0.99[b]	11.88[d]	0.88[a]
Saccharin	1.13[b]	1.01[b]	10.97[c]	0.83[a]
Acesulfame K	0.93[a]	0.98[b]	11.80[d]	1.06[a]

Different superscript indicate values within the column are significantly different at P<0.05 according to LSD

Table 4: Acceptability test of sweetened hog plum juice

	Sucrose	Sucralose	Stevia	Aspartame	Saccharin	Acesulfame K
Colour	7.29[d]	6.23[a]	6.10[a]	6.62[b]	6.71[bc]	7.06[cd]
Aroma	6.91[c]	5.74[a]	5.62[a]	6.38[b]	6.27[b]	6.83[c]
Mouthfeel	7.18[d]	5.69[a]	5.77[ab]	6.39[c]	6.16[bc]	6.95[d]
Taste	7.56[e]	4.25[a]	4.45[a]	5.99[c]	5.38[b]	6.81[d]
Overall Acceptability	7.39[d]	4.98[a]	4.99[a]	6.19[b]	5.81[b]	6.88[c]

Different superscript indicate values within the column are significantly different at P<0.05 according to LSD

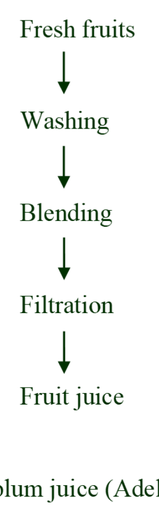

Fig 1: Flowchart for the extraction of hog plum juice (Adelekan *et al*., 2014)

Results (cont'd)

The ideal sweetness level of sucrose was 9.95g/100ml, and the equivalent concentrations of sucralose, acesulfame K, stevia, saccharin, and aspartame were 0.0186, 0.0316, 0.1157, 0.0316, and 0.0580g/100ml, respectively. The proximate results showed that the fat and fiber contents did not vary significantly among the sweetened juices; the carbohydrate contents ranged from 4.45 to 13.60% and were highest in the sucrose-sweetened sample. Protein content was highest in the sucralose-sweetened juice, while ash content was highest in the stevia-sweetened juice. The concentrations of vitamin C and beta carotene ranged from 7.63 to 11.88 mg/10 g and from 0.70 to 1.06 mg/100 g, respectively. Juices sweetened with acesulfame k and aspartame exhibited acceptable sensory quality and overall acceptability, though lower than that of the sucrose-sweetened juice.

Conclusion

Sweetening *Spondias mombin* juice may contribute to its increased consumption. The sweetened juice is rich in many nutrients that are beneficial for health. More studies are needed to ascertain the health effects of both short term and long-term use of artificial sweeteners,

References

Adelekan, A. O., Arisa, N. U., Alamu, A. E., Adebayo, Y. O., Popoola, G. J. T. (2014). Production and Acceptability of Fruits Enhanced Zobo Drink. *Food Science and Technology* 5.1: 046-051.

Association of Official Analytical Chemists (AOAC 2000.) Official Methods of Analysis of AOAC International, 17th edition; AOAC International: Gaithersburg, MD, USA

Cadena, R. S. and Bolini, H. M. A. (2012). Ideal and relative sweetness of high intensity sweeteners in mango nectar. *International Journal of Food Science and Technology* 12:991– 996.

Marcellini, P. S., Chainho, T. F., Bolini, H. M. A. (2005). Ideal sweetness and acceptance analysis of reconstituted pineapple juice concentrate sweetened with different sweeteners and sucrose. *Food and Nutrition Journal* 16:177– 182.

Mishra, P., Brahma, A., Seth, D., (2017). Physicochemical, functionality and storage stability of hog plum (*Spondia pinnata*) juice powder produced by spray drying. *Journal of Food Science and Technology* 54:1052–1061.