Original Research Article

STUDIESONPREPARATIONANDVALUEADDITIONONGUAVAFRUITBAR

ABSTRACT

The experiment was conducted at the Post Harvest Technology Lab, Department of Horticulture,SHUATS,Prayagraj(UttarPradesh)duringtheyear2021-2022.Theexperimentconsistedof10different treatments and control comprising the Guava bar fortified with beetroot puree anddifferent dry fruit powder like cashew, almond, pistachio with an aim to produce new valueaddition in guava fruit bar. The treatment consists of different blends of guava pulp and beetrootpureeanddifferentdryfruitpowderwereevaluatedforphysico-chemicalandsensorycharacteristicsandshelflifeinambientconditionsandstorage.Theevaluationforotherparameters, like moisture, total soluble solids, titratable acidity, pH and ascorbic acid were doneupto90daysatmonthlyintervals.Themoisture,TSSandtitratableacidityincreasedfromstorageperiod of 90 days, where as there is a slight decline in the parameters like pH, ascorbic acid,reducing sugar from 60 days to 90 days of storage. Fruit Bar was tested for the physico-chemicalchanges after preparation, and sensory evaluation was done based on the 9-point hedonic scaletested on a panel of 5 experts. This fruit bar was stored for about 90 days at ambient temperature.Fromstoragestudies,itwasrevealedthatT_4(84%guavapulp+15%beetrootpuree+1%cashewpowder)ismostsuitableintermsoftheirphysicochemicalpropertiesandorganoleptictestofbar.Theeffectofstorageon Physico-chemicalandorganoleptic characteristicswasalsoobserved.

Keywords:-Guava,beetroot,fortifiedfruitbar

INTRODUCTION

Guava(*Psidiumguajava*L.)isacommercialfruitcropthatiswidelyconsumedinIndia.Itisfourthmostimportantfruitinourcountryafterbanana,mango,andcitrus.Itiswidelygrowninthestatesof Uttar Pradesh, Madhya Pradesh, Bihar and Maharashtra. It is a good source of ascorbic acid,pectin,sugars andcertain minerals**(Adree*et al.*,2010).**

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ThetotalareaunderguavainIndiais2.03lachawiththeproductionof4.43millionmetrictonnes(NHBdatabase,2020-21).

Guava is not only a wholesome fruit but also provides lot of vitamins and minerals. Guava's highvitamin C content (ascorbic acid) makes it a powerhouse in the fight against free radicals andoxidation,which aremajor enemiesof many degenerativediseases. **(Kadam *et al.*, 2012).**

Guava has a high commercial potential due to its ease of cultivation, high nutritional value, andpopularity of processed ~~Guava~~ guava products. While ripe fruit is usually eaten as a dessert, processedproductslikejuices,nectar,jam,jellies,babyfoods,puree,beveragebase,syrupandwineareal sopreparedfrom guava**(Shankar *et al.*, 2006)**

Among major processing techniques employed on industrial scale to preserve fruits such ascanning, freezing, etc., dehydration of perishable fruits is best suited for developing countries,which have poor infrastructure for storage at low temperatures and processing. Dehydrated fruitsprocessingisgainingimportancenowadaysdue tolongshelflife.Therefore,preparationoffruitbarwith different dry powder is beneficial.

Fruitleathersorbarsaredehydratedfruit-basedproducts.Thedestructionoforiginalfruitstructurethrough pureeing and restructuring in dehydrated sugar-acid-pectin gels known as "fruit leathers"results in attractive, coloured products, on which research is currently being expanded. Fruitleathersalso allowforthepreservationofoverripefruits.**(Natalia*et al.*, 2011).**

The guava fruit contains negligible vitamin B content. So, beetroots (vegetable)with highvitaminB9contentareselectedtoblendwithandfortifyguavafruitbar.Beetrootsarerichinfibre,folate (vitamin B9), manganese, potassium, iron, and vitamin C. So, beetroot puree is used forenhancing the vit-B content of guava fruit bar. Future addition of beetroot not only enrichesvitaminB, but also givesbetter colour to thefruitbarorleather.

MATERIALANDMETHODS

The experiment was conducted at the Post Harvest Technology Lab, Department of Horticulture,SHUATS,Prayagraj (UttarPradesh) during theyear 2021-2022.

Guava (*Psidium guajava* L.) cv VNR Bihi and Beetroot (*Beta vulgaris L.*)were obtained fromlocalmarket of Rambagh, Allahabad during 2021-22 winterseason.

The study was conducted in Completely Randomized Design (CRD) with 10 treatments andreplicatedthrice.Thebarwastestedforthephysico-chemicalchangesafterpreparationandduringstorageatambientconditions.pHoftheproductwasdetermined using digital pH meter, TSS using hand refractometer, titrable acidity using titrimetric method, moisture content by weighing thesamplebeforeandafterdryinganddeterminingthedifferencewhereasascorbicacidwasdetermined by titrating the product against 2, 6-dichlorophenol indophenol indicator (A.O.A.C,1990). Sugars were estimated by Lane and Eynon"s method (1923) in terms of sugar.The productwas evaluated for colour, flavour, texture and overall acceptability. The characters with meanscoresof 5 or moreout of 9 marks wereconsideredacceptable.

Flowchartforpreparationofguavafruitbar

Guavaandbeetroot
↓Washing
↓
Peelingandpulp
↓Mixing ofpulp
↓Heating
↓Additionofsugar
↓
Additionofcitricacid
↓
SpreaddownstainlesssteelwithGlycerine
↓Drying
↓
Coolingindriedsheet
↓
Cuttingandpacking

List 1: TREATMENTTABLES

SLNo.	Treatments	TreatmentCombination
1.	T_0	Control
2.	T_1	94% pulp +5% beetrootpuree+ 1% cashew
3.	T_2	94% pulp+5% beetroot puree+ 1% almond
4.	T_3	94% pulp + 5% beetroot puree+ 1% pistachio
5.	T_4	84% pulp +15% beetrootpuree+ 1% cashew
6.	T_5	84% pulp+15% beetroot puree+1% almond
7.	T_6	84% pulp + 15% beetroot puree+ 1% pistachio
8.	T_7	74% pulp +25% beetrootpuree+ 1% cashew
9.	T_8	74% pulp+ 25% beetroot puree+ 1% almond
10.	T_9	74% pulp +25% beetrootpuree+ 1% pistachio

RESULTSANDDISCUSSION

Inthepresentinvestigation,possibilitieswereexploredforpreparationoffortifiedguavafruitbarblended with beetroot pureeanddifferent dry fruit using differentrecipes.

Physico-chemical and organoleptic quality of

barMoisturecontent

The highest moisture content (14.89 %) found in T_4 (84% guava pulp+ 15% beetroot puree+ 1 %cashew)followedby(14.75%)foundwithT_5(84%guavapulp+15%beetrootpuree+1%almond)andl eastmoisturecontentwasfoundwithT_0control(100%guavapulp)(13.43%).Similarresultshavebeen reported by **Aleem*et al.* (2012)**incomposite flour-based biscuits.

Highmoisturecontentinthefruitbarscreatesfavourableconditionsforthegrowthofundesirablemicroor ganisms&foodhazardsofvariouspreservedfoods**(Fontana,2000).**Whilelowmoisture

contentcaninhibitmicrobialgrowthandenhanceshelf-lifeoftheproduct.Incaseof fruitleather,itmaynegativelyinfluencethetexturequalityHuangandHsieh(2005)and**Irwandi*etal*.(1998).**

TSS(ºBrix)

The best T.S.S. (79.56^{0}Brix) found in T_4 (84% guava pulp+ 15% beetroot puree+ 1 % cashew)followedby(79.23°Brix)found~~with~~inT_5(84%guavapulp+15%beetrootpuree+1%almond)andleast T.S.S. was found with T_0control (100 % guava pulp) (74.56^{0}Brix). The findings of thisinvestigation are consistent with the findings of **Baramanray*et al.* (1995)** in evaluation of guava(*Psidiumguajava L.*) hybrid for making nectar.

Titrableacidity(%)

Thebesttitrableacidity(0.91%)foundinT4(84%guavapulp+15%beetrootpuree+1%cashew)followed by (0.90%) found ~~with~~ in T_5(84% guava pulp + 15% beetroot puree+ 1 % almond) andleast titrable acidity was found ~~with~~ in T_0(100% guava pulp) (0.71%). The product remainedsignificantupto90days ofstorageTheresultsof presentinvestigation areinaccordancewiththefindingsof**Anju *et al*(2014)**inpeach-soy fruit leather.

pH

The best pH (3.98) found in T_4 (84% guava pulp + 15% beetroot puree + 1 % cashew) followedby (3.94) found ~~with~~ in T_6 (84%pulp + 15% beetroot puree+ 1 % pistachio) and least pH was found~~with~~inT_0control(100%guavapulp)(3.61).SimilarresultsofpHwerereportedinpineappleleather by **Phimpharian*et al* (2011),** mango leathers by **Azeredo*et al.* (2006),** pawpaw and guavaleathersby Babalolaet al(2002) and Appleleathersby**Natalia *et al* (2012).**

Totalsugars

The best total sugar (67.48%) was found in T_4 (84% guava pulp + 15% beetroot puree+ 1% cashew)followed by (66.69%) found ~~with~~ in T_5 (84% guava pulp + 15% beetroot puree + 1 % almond) andleast total sugar was found ~~with~~ in T_0control (100 % guava pulp) (63.21). The results of presentinvestigationareinconformitywiththefindingsof**Kuchi*etal*.(2014)**instandardizationofrecipe forpreparation ofguavajelly bar.

Ascorbicacid (mg/100g)

Thebestascorbicacid(225.51mg/100g)was foundinT_0(100%guavapulp)followedby(225.03mg/100g) found ~~with~~ in T_2 (94% guava pulp+ 5% beetroot puree+ 1% almond) and leastascorbic acid was found ~~with~~ in T_7 (74 % guava pulp + 25 % beetroot puree + 1% cashew). Similarresultshavebeenreportedby~~of~~**Fennema,(1996)**whoreportedthatthedecreaseinascorbicacidcontentduring drying wasdueto prolonged heatingin thepresenceof oxygen during processing**.**

Organolepticevaluation

Intheorganolepticevaluationsuchascolorandappearance,taste,aroma,~~,~~andoverallacceptability~~.~~. ~~Sensory~~ sensory scores for treatment T_4 (84% Guava pulp + 15% beetroot pulp + 1% cashew) were foundto be the highest in all parameters of organoleptic attributes. The highest overall acceptability score(8.)indicated that it waswell-received by thejudges.

Table1.Effectofdifferenttreatmentsofguavafruitbaronmoisturecontentandtotalsugars(%).

Treatments	MOISTURECONTENT				TSS			
	Storageperiod (days)				Storageperiod (days)			
	0	30	60	90	0	30	60	90 120
T_0	14.01	13.88	13.65	13.43	73.95	74.16	74.35	74.56
T_1	14.10	13.98	13.76	13.55	74.59	74.78	74.92	75.19
T_2	14.12	13.96	13.70	13.58	74.05	74.26	74.43	74.62
T_3	14.19	13.91	13.68	14.50	74.65	79.82	74.98	75.25
T_4	15.98	15.87	15.08	14.89	78.94	79.15	79.37	79.56
T_5	15.85	15.66	15.10	14.75	78.65	78.82	79.01	79.23
T_6	15.79	15.59	15.09	14.88	78.25	78.46	78.65	78.86
T_7	15.12	14.98	14.72	14.52	75.95	76.18	76.35	76.54
T_8	14.98	14.88	14.67	14.48	76.12	77.35	77.52	77.79
T_9	14.58	14.38	14.10	13.92	76.25	76.62	76.95	77.64
F-test	NS	NS	NS	NS	S	S	S	S
S.Ed(±)	0.22	0.23	0.24	0.21	1.032	1.321	1.456	1.576
CD@ 5%	0.44	0.46	0.49	0.43	20.025	2.731	2.834	3.015

Table2.Effectofdifferenttreatmentsofguava fruitbarontitrableacidity andpH.

Treatments	TITRABLEACIDITY				pH			
	Storageperiod (days)				Storageperiod (days)			
	0	30	60	90	0	30	60	90
T_0	0.77	0.75	0.73	0.71	3.58	3.59	3.60	3.61
T_1	0.90	0.88	0.85	0.83	3.65	3.66	3.67	3.68
T_2	0.89	0.85	0.82	0.79	3.61	3.62	3.63	3.64
T_3	0.95	0.93	0.90	0.88	3.66	3.67	3.68	3.69
T_4	1.02	0.98	0.95	0.91	3.95	3.96	3.97	3.98
T_5	0.98	0.95	0.92	0.90	3.87	3.88	3.89	3.90
T_6	0.95	0.92	0.89	0.86	3.91	3.92	3.93	3.94
T_7	0.93	0.90	0.87	0.84	3.81	3.82	3.83	3.84
T_8	0.89	0.86	0.83	0.80	3.82	3.83	3.84	3.85
T_9	0.91	0.87	0.85	0.83	3.84	3.85	3.86	3.87
F-test	S	S	S	S	S	S	S	S
S.Ed(±)	0.02	0.01	0.02	0.01	0.004	0.006	0.006	0.008
CD@ 5%	0.05	0.04	0.48	0.39	0.17	0.015	0.016	0.014

Table2.Effectofdifferenttreatments ofguavafruitbarontotal sugarand ascorbicacid.

Treatments	TOTALSUGAR				ASCORBICACID			
	Storageperiod (days)				Storageperiod (days)			
	0	**30**	**60**	**90**	**0**	**30**	**60**	**90**
T_0	63.58	63.45	63.33	63.21	226.59	225.95	225.75	225.51
T_1	64.89	64.79	64.65	64.49	225.56	225.12	224.89	224.67
T_2	64.75	64.61	64.48	64.32	225.86	225.65	225.34	225.03
T_3	64.95	64.6	64.71	64.59	225.31	224.95	224.56	224.10
T_4	67.89	67.75	67.60	67.48	223.35	223.05	222.82	222.62
T_5	67.25	67.02	66.88	66.69	223.89	223.51	223.31	223.05
T_6	67.78	67.10	66.80	66.51	223.64	223.31	223.05	222.82
T_7	66.88	66.67	66.42	66.21	221.13	220.95	220.67	220.38
T_8	66.59	66.34	66.15	65.98	221.35	221.02	220.76	220.51
T_9	66.75	66.52S	66.31	66.05	221.82	221.64	221.31	221.08
F-test	S	S	S	S	S	S	S	S
S.Ed(±)	0.95	0.93	0.92	0.96	2.95	2.93	2.92	2.96
CD@ 5%	1.789	1.832	1.845	1.925	4.789	4.832	4.845	4.925

Fig 1.guava fruitbar

CONCLUSION

Based on the findings of the present experiment it ~~is~~ can be concluded that treatment T_4 (84% guavapulp+15%Carrotpuree+1%cashew)was found to bethebest~~in~~ with respect~~of~~to moisture(14.89%
), T. S.S.(79.56°Brix), titrable acidity (0. 91%), pH (3. 98), total sugar (67.48 %), ascorbic acid(53.57mg /100 g), and also based on the sensory evaluation scores as well as highest cost benefitreturns(2.50).

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