



Utilization of soft type wild jackfruit as fruit leather : a step towards economic security of the tribal women in Odisha.

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ABSTRACT

The present study was carried out in the Laboratory of OUAT (Orissa University of Agriculture and Technology) and Central Horticulture Experiment Station (ICAR-IIHR), Bhubaneswar during the year 2017-2018. The protocol of leather from soft type Jackfruit was standardized and the chemical analysis was done from the collected samples from different districts and results suggested that Khurda district sample have highest TSS value (15.4°Brix) and Gajapati district sample has highest acidity (1.6%). Ascorbic acid content was highest in Ganjam (15.38 mg) and Gajapati district (15.36 mg). The pH value and moisture content was highest value (pH 5.7) in Khurda and Kandhamal (40%), respectively. Mould count was highest for Kandhamala sample 2.51×10^5 cfu and minimum in Khurda sample 0.36×10^5 cfu. Organoleptic characters like colour, appearance, flavour, texture, taste and overall acceptability depicts that the sample1 (sun-dried) gives more excellent result than others, followed by sample38 (sun-dried + microwave) and sample44 (microwave). Among the packaging options, it was observed that the butter paper and aluminium foil unwrapping was quicker than cling film and butter paper packing. Both butter paper and aluminium packaging were appealing to the respondents as compared to cling film packed and open samples. The present study successfully established the viability of preparation of leather from soft type jackfruit, which is abundantly available in Odisha, paving way for creating another avenue for income generation in tribal regions of the State.

Keywords: Leather, mould count, organoleptic characters, soft type jackfruit

Currently, in Odisha Jack fruit (soft type *i.e.* *kadua*) are underutilized in both human and animal nutrition primarily due to lack of information on their commercial and nutritional potential and lack of consumer preference (Gunasena *et al.*, 1996; Srinivas *et al.*, 2018). In Odisha jackfruit is not grown as a commercial crop. Fruits are collected from self grown trees from forests and other areas. The soft type (*kadua*) fruits dominate in Odisha which are not liked by consumers as that of hard fleshy type (*khajara*) fruits. Moreover these fruits are available only for a couple of months. Ripe soft type (*kadua*) fruits, though highly nutritive, are often getting wasted and there is a need to devise ways to utilize them for creating new livelihood options (Srinivas *et al.*, 2018). In many districts of Odisha, there are lot of soft type jackfruit which were wasted because of less commercial value as well as people are not much aware about the utilization and marketing this particular type of jackfruit in various way. Hence, preparation of leather of soft type Jackfruit is perceived as a viable option in such a scenario. It would enable the tribal and rural population to process and preserve the excess ripe fruits and exploit its commercial potential. This will definitely enhance the livelihood status of tribal population.

Keeping this in view the objectives formulated are:

1. To standardize the procedure for utilization of soft type (*Kadua*) jackfruits as fruit leather from wild grown trees in Odisha.
2. To study its physical properties, chemical properties and shelf life of the product.

MATERIALS AND METHODS

The present study was carried out in the Laboratory of OUAT (Orissa University of Agriculture and Technology) and Central Horticulture Experiment Station (ICAR-IIHR), Bhubaneswar during the year 2017-2018.

Preparation of jackfruit leather *viz.* selection, collection, cutting and deseeding of fruit were done, blanching and pulping were done by heating and grinding the pulp, then finally drying, sheet making (leather bar) process were carried out. Physical characteristic of fresh fruit *viz.* fruit, seed and pulp weight and colour of flakes were observed.

The chemical analysis was done for the parameters *viz.* total soluble solids {with the help of Atago make RX1000 digital refractometer and data was recorded as °Brix, Choudhury *et al.* (2006)}, titratable acidity {as per the method described by AOAC (1984)}, ascorbic acid (estimated as per method given by Ranganna (1986) (using 2, 6-dichlorophenolindophenols), pH (measured by using Perkin Elmer pH meter after calibration of the instrument with standard buffer solutions (Prasad and Mali, 2006)}, moisture content {carried out in hot air oven (Nayak *et al.* 2018)}.

Determining microbial load of jackfruit leather sample *viz.* media preparation, sample preparation and plating was carried out to count the mould growth.

The organoleptic qualities were done for the parameters viz. colour, texture, taste, appearance, flavour (Barooah *et al.*, 2015) leather from jackfruit samples were evaluated according to 9 point hedonic scale)

Table 1: 9-Point Hedonic Scale

9-Point Hedonic Scale	
9	Like extremely
8	Like very much
7	Like moderately
6	Like slightly
5	Neither like nor dislike
4	Dislike slightly
3	Dislike moderately
2	Dislike very much
1	Dislike extremely

Storage of jackfruit leather viz. Ingredientssugar, salt, water, oil (mustard oil), packaging materials (aluminum

foil (Che-man and Sanny (1996), butter paper (Krishnaveni *et al.*, 1999), cling film sheet and storage condition (freeze and open condition) and the final ratings were taken by using 9-scale hedonic scale (Table 1).

Chemicals and drying equipments used: This experiment was free from chemicals, not a single chemical was used and drying equipment *i.e.* hot air oven and microwave was used, which is present in the laboratory of Central Horticulture Experiment Station (ICAR-IIHR), Bhubaneswar, Odisha. (Pushpa *et al.*, 2006).

RESULTS AND DISSCUSSION

Out of five samples taken from five districts the sample 15 of Khurda districts have highest TSS value (15.4°Brix). The sample38 (Gajapati district) has highest acidity with 1.6%. Sample1 of Ganjam district has highest ascorbic acid content (15.38 mg). pH value of sample15 (Khurda district) had the highest value (pH

Table 2: Chemical analysis of jackfruit leather made from different samples

Sl. No.	District	Sample no.	Total soluble solid (°Brix)	Titratable acidity (%)	Ascorbic acid (mg)	pH			Moisture (%)
						5ml	10ml	average	
1	Ganjam	Sample1	12.7	0.32	15.38	4.7	4.74	4.72	20
2	Khurda	Sample15	15.4	0.32	7.69	5.7	5.71	5.70	10
3	Nayagarh	Sample27	10.2	0.32	15.30	5.63	5.64	5.63	10
4	Gajapati	Sample38	8.9	1.60	15.36	5.31	5.51	5.41	10
5	Kandhamal	Sample44	5.3	0.32	7.66	5.38	5.46	5.42	40

5.7). Sample44 (Kandhamal district) has highest % moisture content (40%).

Table 3: Details of mould count (after 2 months)

Sl. No.	District	Sample no.	Microbial load (cfu)
1	Ganjam	Sample 1	1.16x10 ⁵
2	Khurda	Sample 15	0.36x10 ⁵
3	Nayagarh	Sample 27	2.11x10 ⁵
4	Gajapati	Sample 38	1.86x10 ⁵
5	Kandhamal	Sample 44	2.51x10 ⁵

Following the detail procedure from the methodology of mould count the result of five samples was derived, which has been shown in the table 3 and presented in the fig. 2.

Organoleptic like colour, appearance, flavour, texture, taste and overall acceptability of five different sample was evaluated by a panel of 10 respondents from CHES (Central Horticulture Experiment Station) using hedonic scale (0-9 points) and their responses (taking average of all responses) were recorded, and the data's

were presented in the table (1.4), from the table it was observed that the sample 1 (sun-dried) gives more excellent result than others

Storage studies was done after storage of leather for 30 days, the observations were taken by using 9-scale hedonic scale with the help of 4 respondent from CHES (Central Horticulture Experiment Station-IIHR-Bhubaneswar) for the categories like odour/flavor, packaging (for the medium like butter paper, aluminum paper, cling film and one left untreated with any packing material), taste and firmness/softness (Table 1.5). It was observed that the odour/flavor in open conditions stays longer than in freeze condition, taste of leathers was good at open condition than in freeze condition, it has also marked that firmness/softness in open condition was better than the freeze condition. The oil coat which was applied to both the sample (open condition and freeze condition) found that oil remain in the freeze condition than in open condition, It was also observed that the sample in freeze condition stayed fresher than the sample in open condition. Among the packaging options, it was

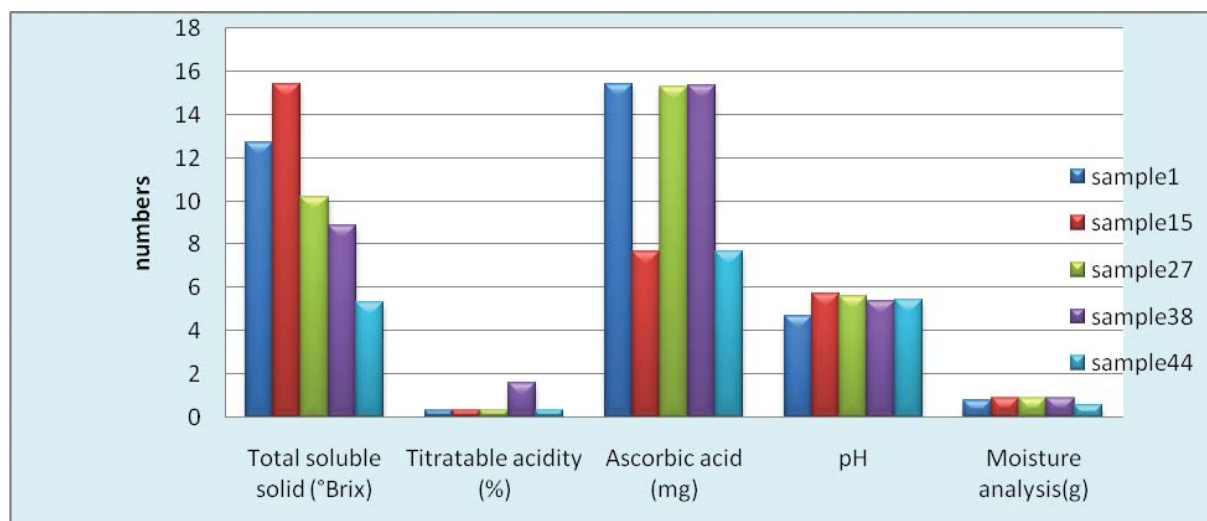


Fig. 1: Diversity in chemical parameters of jackfruit leather samples

Table 4: Efficacy of mode of drying on organoleptic values and overall acceptability

Sl.	Mode of drying	Colour	Appearance	Flavour	Texture	Overall acceptability
1	Sun dried	8.6	8.5	8.1	8.2	8.5
2	Hot air oven	5.7	5.5	5.2	6.0	5.7
3	Microwave	6.6	6.5	6.9	6.0	7.0
4	Sundried + microwave	8.5	8.3	8.3	8.1	8.3
5	Microwave	7.4	7.2	7.8	7.6	7.6

Table 5: Showing the detail of storage

Conditions	Odor/ flavor	Packing			Taste	Firmness softness	
		Aluminum foil	Butter paper	Cling film			Open /control
Freeze	6.3	9.5	8.5	3.0	8.5	7.8	6.2
Open	8.5	9.0	9.1	3.2	6.3	8.9	9.1

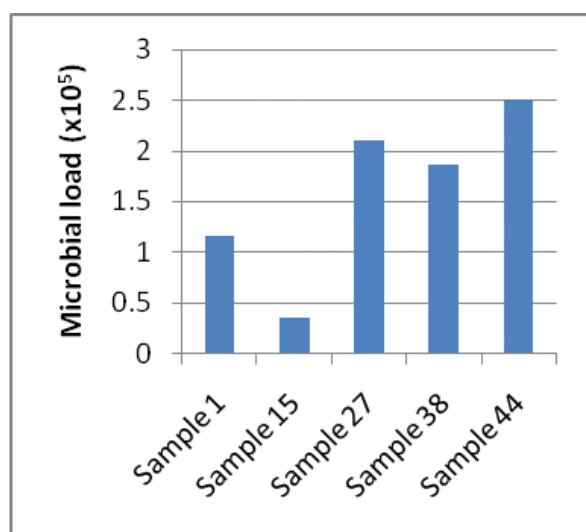


Fig. 2: Variation in microbial load on the jackfruit leather under long term storage

observed that the butter paper and aluminum foil unwrapping was quicker than cling film and butter paper packing.

The preparation of leather from soft type of jackfruit was standardized and the chemical analyses were for five different samples taken from five districts. Out of five samples taken from five districts ‘sample 15’ from Khurda district have the highest TSS value (15.4°Brix) suggesting the fruits to be sweetest but fruits of Gajapati district (sample 38) has highest acidity with 1.6%. Ascorbic acid content was highest in Ganjam district (sample 1) with 15.38 mg. The pH value was maximum in sample 15 from Khurda district with pH 5.7 and Kandhamal district (sample 44) has the highest moisture content with 40% respectively. Mould count was highest for Kandhamala District (sample 44) with 2.51x10⁵cfu. In organoleptic sample 1 (Ganjam district) (sun-dried) gives more excellent result than other.

After 30 days of storage it was observed that taste, firmness and odour from open condition sample was far better than from freeze condition. Among the packaging options, it was observed that the butter paper and aluminum foil unwrapping was quicker than cling film and butter paper packing. Investigated the suitability of different packing material for the storage of the jackfruit bars and indicated that jackfruit bars stored in modified polypropylene packets (MPP) recorded higher per cent of nutrient retention and minimum microbial count. The commercial viability of the product also depends on the overall appearance and the taste.

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