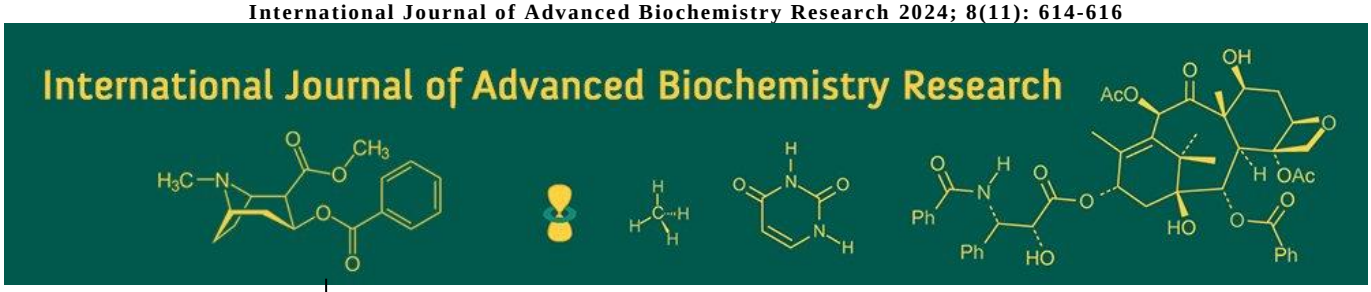

ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; 8(11): 614-616
www.biochemjournal.com
Received: 04-09-2024
Accepted: 09-10-2024

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Change in sensory evaluation and microbial count of jackfruit seed flour during storage

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DOI: https://doi.org/10.33545/26174693.2024.v8.i11h.2927

Abstract
In the experiment i.e. 'Change in sensory evaluation and microbial count of jackfruit seed flour' carried out, completely randomized design (CRD) was used with four treatments viz. T_1 ('0' month), T_2 (1 month), T_3 (2 months) and T_4 (3 months) were studied. The prepared jackfruit seed flour was analyzed for colour, texture, flavour overall acceptability. During three months storage of jackfruit seed flour, In case of sensory evaluation of jackfruit seed flour, the score for colour, flavour, texture and overall acceptability decreased from treatment T_1 i.e. '0' month to T_4 (3 months) during storage. Treatment T_1 ('0' month) for jackfruit seed flour obtained highest scores for colour, flavour, texture and overall acceptability. However, till 3 months storage (T_4) jackfruit seed flour was acceptable for market.
During three months storage (T_1 to T_4) of jackfruit seed flour no microbial growth was detected. From above findings it is observed that treatment, T_2 (90% jackfruit juice+ 10% kokum juice) was found to be best for preparation of jackfruit-kokum blended jelly. The seed flour of jackfruit can be stored for three months in good conditions.

Keywords: Jackfruit, seed flour colour, flavour, texture, microbial count

Introduction
The world's largest fruit, growing to a maximum length of 60 centimetres and a maximum weight of 18 kilogrammes, is the jackfruit, which is evergreen trees. Its aggregate is ellipsoidal, made up of many "bulbs of seed" with flesh encircling a stringy core, all encased in a rough rind. Large stiff glossy green leaves, measuring 15 to 20 cm in length, are characteristic of the jackfruit tree, which reaches a maturity height of 15 to 20 meters. A lot of blooms are carried on club-shaped rachis by monecious jackfruit trees. Men's spikes are found on both fruit stalks and terminal branchlets, whilst female spikes are carried on fruit stalks. After three to six days following anthesis, a spike has finished pollinating and fertilising. Sorosis is the botanical term for the multiplication of fruit that results from the simultaneous growth of the ovaries, perianths, and inflorescence axis. A well-developed tree may yield up to 700 fruits year, with each fruit weighing between 0.5 and 50 kg. An acre of land can provide an average of 50–86 tonnes of fruit.
There are 500 seeds in each fruit. The seeds are light brown to brown, 2-3 cm long and 1-1.5 cm wide. As long as they are kept in cold, humid circumstances, jackfruit seeds may be stubbornly preserved for up to a month.
Native to the Western Ghats of India, the jackfruit grows in the jungle. South and south-east Asia's tropical lowlands, as well as some areas of central and Brazilian and eastern African regions (Anonymous, 2012) [1].
The states that produce the most jackfruit in India include Tamil Nadu, Andhra Pradesh, Telangana, Kerala, Tripura, Orissa, Assam, West Bengal, Chhattisgarh, Jharkhand, Madhya Pradesh, and Karnataka. Though it is produced on sporadic plantations, jackfruit is popular in the eastern Vidarbha zone of Maharashtra and is effectively grown in the Konkan region (Ekta *et al*., 2018) [4]. In 2018, Kerala designated it to be the state fruit. According to Anonymous (2019) [3], in 2018 India produced 18,57,000 MT of jackfruit on 1,87,000 hectares of cultivation.
Since jackfruit was once considered the "poor man's food," the local impoverished people in the jackfruit-growing region utilised it as a daily meal in place of rice. India stands for the world globally recognised pioneer in jackfruit production. The fruit that gets the least use is this one.

Objective and Hypothesis

Jackfruit being a neglected fruit crop of this region, very limited research has been conducted on extending the shelf life and value-addition in jackfruit seed. Therefore, the present studies are undertaken

Materials and Methods

The present investigation was undertaken in the Fruit and Vegetable Processing Unit, College of Horticulture, Dapoli-415712, Dist. Ratnagiri, Maharashtra State (India) during the year 2021-2022. Soft flesh jackfruits seeds were used for study and they were analysed for chemical composition. During the course of investigation jackfruit seed flour was prepared. and change in sensory evaluation and microbial count were studied during three months' storage at ambient temperature (27 to 30 °C).

Sensory evaluation of jackfruit seed flour under study was done with the help of a panel of ten judges for evaluating the colour, flavour, texture and overall acceptability by using a nine-point hedonic scale (Amerine *et al*. 1965) [1]. The overall quality score was obtained by averaging the score for colour, flavour and texture.

Experimental material

Crop	Jackfruit (*Artocarpus heterophyllus* L.)
Design	CRD
No. of treatments	5
No. of replications	4
No. of glass jars used per treatment per replication	2
Total glass jars used	40

Treatment details

Treatments	Month
T_1	1
T_2	2
T_3	3
T_4	4

The ripe, soft-fleshed jackfruits were free of disease, and their bulbs were removed. Next, the carpels and seeds were divided. The seeds were then cleaned with water three to four times to get rid of stickiness and dead material. After two days of drying in a cabinet drier, the seeds were weighed using an electronic weighing scale. The powder was made using the dried seeds in the manner described in Fig 1. and kept cold till more research is conducted.

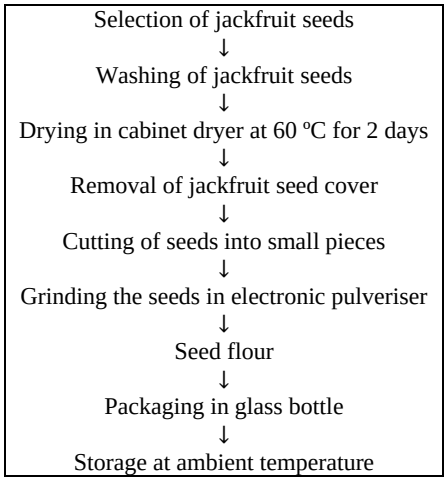

Fig 1: Preparation of jackfruit seed flour

Results and Discussion

Colour

The data regarding the changes in colour of jackfruit seed flour during storage at ambient temperature is presented in Table 1. On an average the score for colour of jackfruit seed flour was 7.70. The highest score for colour was obtained in '0' month i.e. T_1 (7.93) and T_2 (7.83) was at far with T_1. The minimum score for colour was observed in T_4 (7.48) i.e. at 3 months during storage.

The colour of jackfruit seed flour was found to be decreased from T_1 ('0' month) to T_4 (3 months). The gradual decrease in colour in jackfruit seed flour from 7.93 to 7.48 may be due to increase in moisture and acceleration of non-enzymatic browning reaction during storage. Similar result also found by Sonal (2017) [5] observed that the score for colour at the initial stage was 8.1 and after 6 months it decreased up to 7.2 in jackfruit seed flour.

Table 1: Change in colour in jackfruit seed flour during storage.

Treatments	Colour
T_1	7.93
T_2	7.83
T_3	7.54
T_4	7.48
Mean	7.70
S.Em. ±	0.031
C.D. at 1%	0.13

Flavour

The data regarding the changes in flavour of jackfruit seed flour during storage at ambient temperature is presented in Table 2. On average the score for flavour of jackfruit seed flour was 7.32. The highest score for flavour was obtained in '0' month i.e. T_1 (7.58) which was significantly superior over other treatments. The minimum score for flavour was observed in T_4 (6.95) i.e. at 3 months during storage. The flavour of jackfruit seed flour was found to be decreased from T_1 ('0' month) to T_4 (3 months) during storage. The gradual decrease in flavour in jackfruit seed flour from 7.58 to 6.95 may be due to increase in moisture during storage and loss of volatile flavour compounds during storage.

Similar result was found by Sonal (2017) [5], they observed that the highest flavour score recorded by glass bottles at '0' month (8.0) was decreased to 7.0 at 6 months of storage.

Table 2: Change in flavour in jackfruit seed flour during storage.

Treatments	Flavour
T_1	7.58
T_2	7.38
T_3	7.36
T_4	6.95
Mean	7.32
S.Em. ±	0.020
C.D. at 1%	0.08

Texture

The data regarding the changes in texture of jackfruit seed flour during storage at ambient temperature is presented in Table 3. On average the score for texture of jackfruit seed flour was 7.75. The highest score for texture was obtained in '0' month i.e. T_1 (7.87) and T_2 (7.79) was at par with T_1. The minimum score for texture was observed in T_4 (7.63) i.e. at 3 months during storage.

The texture of jackfruit seed flour was found to be decreased from T_1 ('0' month) to T_4 (3 months). The slightly decrease in texture in jackfruit seed flour from 7.87 to 7.63 may be due to increase in moisture during storage.
Sonal (2017) [5] reported that the score for the texture of jackfruit seed flour decreased from 8.1 to 6.7 during 6 months of the storage period.

Table 3: Change in texture in jackfruit seed flour during storage.

Treatments	Texture
T_1	7.87
T_2	7.79
T_3	7.70
T_4	7.63
Mean	7.75
S.Em. ±	0.033
C.D. at 1%	0.14

Overall acceptability
The data regarding the changes in the sensory score for overall acceptability of jackfruit seed flour during storage are presented in Table 4. The average score for overall acceptability was obtained 7.59. The highest score for overall acceptability was obtained in '0' month i.e. T_1 (7.79) and which was significantly superior over others. The minimum score for overall acceptability was observed in T_4 (7.35) i.e. at 3 months during storage.
The overall acceptability of jackfruit seed flour was found to be decreased from T_1 ('0'month) to T_4 (3 months). The slightly decrease in overall acceptability score in jackfruit seed flour from 7.79 to 7.35 may be due to the decrease in score for colour, flavour and texture of jackfruit seed flour during storage. Similar result was mentioned by Sonal (2017) [5]. They observed that the score for overall acceptability of jackfruit seed flour was decreased during storage of six months from 8.1 to 7.3.

Table 4: Change in overall acceptability in jackfruit seed flour during storage.

Treatments	Overall acceptability
T_1	7.79
T_2	7.67
T_3	7.53
T_4	7.35
Mean	7.59
S.Em. ±	0.025
C.D. at 1%	0.10

Microbial count
With respect to data regarding changes in microbial count of jackfruit-seed flour during storage, it is seen that there was no microbial growth observed in jackfruit seed flour during three months of storage (T_1 to T_4) at ambient temperature. Similar results were reported by Sonal *et al*. (2017) [5] in jackfruit seed flour during 6 months storage.

Conclusion
In case of sensory evaluation of jackfruit seed flour, the score for colour, flavour, texture and overall acceptability decreased from treatment T_1 i.e. '0' month to T_4 (3 months) during storage.
Treatment T_1 ('0' month) of jackfruit seed flour obtained highest scores for colour, flavour, texture and overall acceptability. However, till 3 months storage (T_4) jackfruit seed flour was acceptable for market.
During three months storage (T_1 to T_4) of jackfruit seed flour no microbial growth was detected.

Acknowledgements
This work is a part of M.Sc research work, at College of Horticulture, DBSKKV, Dapoli, (M.S.), India. The authors are thankful to the Head and Associate Dean, College of Horticulture, DBSKKV, Dapoli and Research Guide for providing the facilities. Authors extend their sincere thanks to the colleagues of M.Sc. student, Department of Fruit Science College of Horticulture, Dapoli for their support in data collection.

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