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Evaluation of organoleptic quality of tomato and methi leaves powder fortified extruded product

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Abstract

This investigation was carried out to study the impact of fortification with tomato and methi leaves powder (2.5, 5.0, 7.5, 10%) on organoleptic qualities of Jackfruit seed powder based extruded product. The fortified extruded product were subjected to sensory evaluation by semi-trained panel to analyse the quality attributes like colour and appearance, flavour, taste, texture and overall acceptability, using 9 point hedonic scale during storage period of 45 days in ambient storage condition. The extruded product fortified with 5.0 percent tomato powder (T₃) registered highest mean organoleptic scores with respect to colour and appearance (8.22), flavour (8.25), taste (8.25), texture (8.25) and overall acceptability (8.24), which was followed by extruded product fortified with 5.0 percent methi leaves powder during the storage period of 45 days. Whereas, the lowest score was obtained in extruded product fortified with 10 percent methi leaves powder.

Keywords: Extruded product, fortification, tomato powder, methi leaves powder and organoleptic evaluation

Introduction

Consumer demand for convenience foods is now on the rise around the globe. Convenience has an immense impact on the food choices of today's consumers. Today, consumer demand is for much more than just safe and shelf stable food. They demand higher quality food with greater convenience. Moreover, their demand is for food products that are novel, wholesome, nutritious and convenient but still retain their natural characteristics as much as possible.

Extrusion processing is high temperature short time process whereby the food product is exposed to very high temperature for only few seconds. During which the structural change in the food is bound to occur thereby leading to expansion of the product. Extrusion works on the principle of gelatinization of starch, the macromolecule structure of starch molecule opens up and viscous plasticized mass is produced.

The fortification of the extruded products will make them more palatable by adding colour or appearance, taste, flavours and nutrition of the product. Accordingly, extruded products can be fortified with vegetables such as methi leaves and tomato powder. The addition of tomato will enhance the total phenolic content and total antioxidant activity of the extruded product (Altan *et al.*, 2009) ^[1] and fortification with methi leaf powder will increase the fiber, protein, antioxidants and reduces the fat content of the extruded product (Chakraborty *et al.*, 2016) ^[2]. By considering these factors in view, a study was conducted to evaluate the effect of fortification with tomato and methi leaves powder on organoleptic quality attributes of extruded product stored under ambient condition.

Materials and Methods

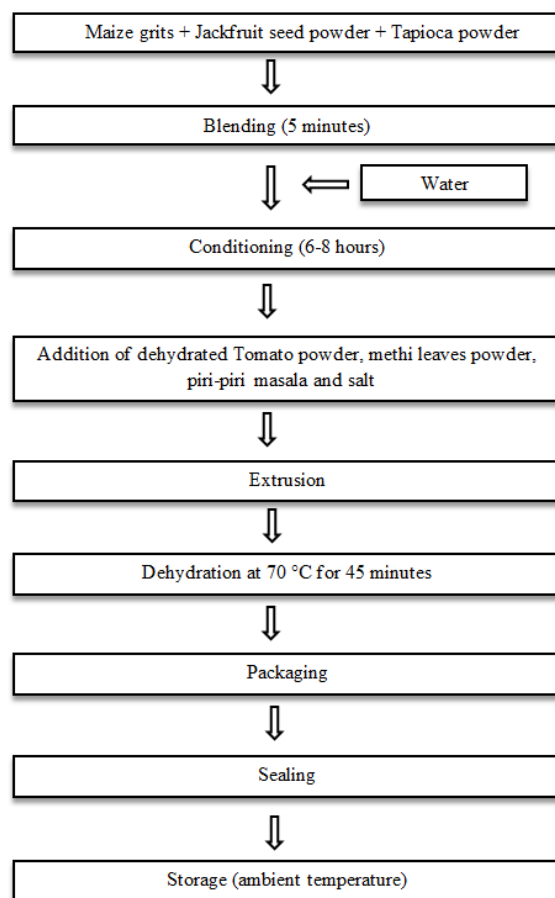
The investigation was carried out in the Department of Post-Harvest Technology, College of Horticulture, Bangalore, Karnataka, during the year 2019-20. The flour combination of 75 percent maize grits, 10 percent jackfruit seed powder and 15 percent tapioca flour preconditioned with 14 percent feed moisture can be used as the base flour combination for the development of the fortified extruded product at barrel-1:50 °C, barrel-2:75 °C, barrel-3:110 °C temperatures.

Organoleptic evaluation of fortified extruded product was carried out by a semi-trained panel consisting of officials of College of Horticulture, Bangalore. Fortified extruded product under

storage were assessed for various quality attributes like colour and appearance, flavour, taste, texture and overall acceptability, by the panel by means of giving score on the basis of 9-point Hedonic scale (1 - dislike extremely, 2 - like only slightly, 3 - dislike moderately, 4 - dislike slightly, 5 - neither like nor dislike, 6-like slightly, 7 - like moderately, 8 -

like very much and 9 - like extremely) (Ranganna, 2008) [3]. Observations were taken at 15 days interval i.e. on initial, 15th, 30th and 45th day of storage.

Process flow chart for production of fortified extruded product



Results and Discussion

Evaluation of sensory qualities of the product is an important tool for deciding the consumer acceptability. In the present investigation, semi-trained panelists comprising teachers and post graduate students of College of Horticulture, Bangalore were involved in the organoleptic evaluation of fortified extruded product.

Colour and appearance of the fortified extruded product was found highest (8.52, 8.46, 8.31 and 8.22) in T₃ (95.0% Best combination + 5.0% Tomato), whereas least score (6.71, 6.55, 6.43 and 6.30) was given to T₁- Control (100% Best combination) from initial to end of the storage respectively and the mean value for sensory score of colour and appearance decreased from 8.02 at initial to 7.70 at the end of the storage. There was gradual decrease in the score of colour and appearance. Among the treatments, T₃ (95.0% Best combination + 5.0% Tomato) had good colour and appearance scores, it might be due to the fact that incorporation of tomato powder at lower levels gives attractive light red colour which was well accepted by the consumers.

Nearly alike results were reported by Omeire *et al.* (2015) [4] in cassava incorporated extruded product and Taneya *et al.* (2014) [5] reported extruded product containing 30 percent sweet potato flour secured highest score.

Flavour of the fortified extruded product decreased

throughout the storage period and their mean value tends to decrease with the advancement of storage period from 8.08 at initial to 7.76 at the end of the storage. Among the different treatments imposed, treatment T₃-95.0% Best combination + 5.0% Tomato was awarded maximum score (8.58, 8.48, 8.37 and 8.25), while least score was allotted to treatment T₉ (6.52, 6.40, 6.28 and 6.13) at initial, 15, 30 and 45 days after storage respectively. Lowest score of flavour in T₉ might be due to typical methi leaf powder flavour and astringency.

Significantly maximum score for the taste (8.47, 8.40, 8.34 and 8.25) was observed in T₃ (95.0% Best combination + 5.0% Tomato) and least score (6.22, 6.20, 6.11 and 6.05) was given to T₉- 90.0% Best combination + 10% Methi from initial to end of the storage respectively. Least scores in T₉ might be due to typical flavour and astringency of methi leaves powder which adds bitterness after taste.

Highest score for texture (8.58, 8.48, 8.37 and 8.25) of fortified extruded product was noted in T₃- 95.0% Best combination + 5.0% Tomato and minimum score was awarded to T₉ (6.52, 6.40, 6.28 and 6.13) at initial, 15, 30 and 45 days after storage respectively. There was a significant difference among the treatments and mean value were found to be decreased with the progress in storage period.

Similar results are reported by researchers and are as follows; Bhattacharya *et al.* (1994) [6] in rice and chick pea blend extruded product, Sumathi *et al.* (2007) [7] in pearl millet

based extruded product, Balfour *et al.* (2012) [8] in corn based extruded product.

Treatment (T₃) with 5 percent fortification of tomato powder showed higher values of overall acceptability during the storage days. The higher value for overall acceptability for the

treatment combinations may be attributed to the attractive colour coupled with blend of flour combination thereby enhancing the appearance and acceptability. A similar result was noticed in barley-tomato pomace blended extruded product (Altan *et al.*, 2008) [9].



Fig 1: Plate 1: Influence of different levels of tomato and methi leaf powder on extruded product

- T1: Control (100% Best combination)
- T2: 97.5% Best combination + 2.5% Tomato
- T3: 95.0% Best combination + 5.0% Tomato
- T4: 92.5% Best combination + 7.5% Tomato
- T5: 90.0% Best combination + 10% Tomato
- T6: 95.0% Best combination + 5.0% Methi
- T7: 92.5% Best combination + 7.5% Methi
- T8: 92.5% Best combination + 7.5% Methi
- T9: 90.0% Best combination + 10% Methi

Table 1: Effect of treatments and storage period on colour and appearance and flavour of jackfruit seed powder fortified extruded extruded product

Treatments	Colour and appearance				Flavour			
	Days after storage							
	Initial	15	30	45	Initial	15	30	45
T1: Control (100% Best combination)	6.71	6.55	6.43	6.30	7.98	7.89	7.80	7.71
T2: 97.5% Best combination + 2.5% Tomato	8.28	8.20	8.09	7.98	8.40	8.31	8.19	8.01
T3: 95.0% Best combination + 5.0% Tomato	8.52	8.46	8.31	8.22	8.58	8.48	8.37	8.25
T4: 92.5% Best combination + 7.5% Tomato	8.17	8.09	7.96	7.84	8.27	8.16	8.04	7.96
T5: 90.0% Best combination + 10% Tomato	7.96	7.85	7.76	7.68	8.00	7.97	7.88	7.76
T6: 97.5% Best combination + 2.5% Methi	8.27	8.17	8.09	7.95	8.34	8.19	8.12	8.03
T7: 95.0% Best combination + 5.0% Methi	8.39	8.26	8.17	8.02	8.49	8.31	8.24	8.11
T8: 92.5% Best combination + 7.5% Methi	8.05	7.97	7.88	7.74	8.15	8.06	7.98	7.86
T9: 90.0% Best combination + 10% Methi	7.87	7.79	7.71	7.63	6.52	6.40	6.28	6.13
Mean	8.02	7.92	7.82	7.70	8.08	7.97	7.87	7.76
S.Em ±	0.06	0.05	0.03	0.08	0.04	0.05	0.04	0.05
C. D. @ 1%	0.28	0.21	0.16	0.27	0.21	0.21	0.17	0.17

Table 2: Effect of treatments and storage period on taste and texture of jackfruit seed powder fortified extruded product

Treatments	Taste				Texture			
	Days after storage							
	Initial	15	30	45	Initial	15	30	45
T1: Control (100% Best combination)	7.98	7.94	7.85	7.78	7.98	7.89	7.80	7.71
T2: 97.5% Best combination + 2.5% Tomato	8.30	8.22	8.15	8.08	8.40	8.31	8.19	8.01
T3: 95.0% Best combination + 5.0% Tomato	8.47	8.40	8.34	8.25	8.58	8.48	8.37	8.25
T4: 92.5% Best combination + 7.5% Tomato	8.21	8.14	8.10	8.02	8.27	8.16	8.04	7.96
T5: 90.0% Best combination + 10% Tomato	8.07	7.99	7.91	7.84	8.00	7.97	7.88	7.76
T6: 97.5% Best combination + 2.5% Methi	8.25	8.20	8.12	8.03	8.34	8.19	8.12	8.03
T7: 95.0% Best combination + 5.0% Methi	8.32	8.25	8.17	8.10	8.49	8.31	8.24	8.11
T8: 92.5% Best combination + 7.5% Methi	8.15	8.11	8.05	7.98	8.15	8.06	7.98	7.86
T9: 90.0% Best combination + 10% Methi	6.22	6.20	6.11	6.05	6.52	6.40	6.28	6.13
Mean	8.00	7.93	7.86	7.80	8.08	7.97	7.87	7.76
S.Em ±	0.03	0.05	0.05	0.04	0.04	0.05	0.04	0.05
C. D. @ 1%	0.15	0.17	0.14	0.12	0.21	0.21	0.17	0.17

Table 3: Effect of treatments and storage period on overall acceptability of jackfruit seed powder fortified extruded product

Treatments	Overall acceptability			
	Days after storage			
	Initial	15	30	45
T ₁ : Control (100% Best combination)	7.97	7.89	7.81	7.73
T ₂ : 97.5% Best combination + 2.5% Tomato	8.33	8.24	8.14	8.03
T ₃ : 95.0% Best combination + 5.0% Tomato	8.52	8.45	8.34	8.24
T ₄ : 92.5% Best combination + 7.5% Tomato	8.22	8.13	8.03	7.94
T ₅ : 90.0% Best combination + 10% Tomato	8.04	7.96	7.88	7.79
T ₆ : 97.5% Best combination + 2.5% Methi	8.29	8.18	8.11	7.99
T ₇ : 95.0% Best combination + 5.0% Methi	8.45	8.27	8.19	8.07
T ₈ : 92.5% Best combination + 7.5% Methi	8.12	8.05	7.97	7.86
T ₉ : 90.0% Best combination + 10% Methi	6.48	6.38	6.27	6.17
Mean	8.04	7.95	7.86	7.75
S.Em \pm	0.05	0.05	0.02	0.04
C. D. @ 1%	0.17	0.16	0.11	0.12

Conclusion

Fortification with 5 percent of tomato, 2 percent each of salt and piri-piri masala to the base flour combination (75 percent maize, 10 percent jackfruit seed powder and 15 percent tapioca with 14 percent moisture) showed best in organoleptic acceptance up to 45 days of storage under ambient storage condition.

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