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Value Added Studies in Banana as a Commercial Enterprise

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A B S T R A C T

Banana being a highly perishable fruit, suffers from high post-harvest losses to the extent of about 30 to 40 per cent. Among the several techniques available for preservation or processing of banana, dehydration is widely adopted technique for banana and also banana processing industry to take advantage of market opportunities, consequently contribute to the improvement of living standards of farmers by improving employment opportunities. With this connection a study was conduct to estimate the recovery percentage, cost of investment and returns of banana processing products like banana crisps and banana papads. With respect to papads, average papad recovery was 36 kg per every 100kg of banana. Whereas in case of crisps, average dried crisps recovery is 45 kg per every 100 kg of banana. In case of Net returns and benefit cost ratio from banana crisps is Rs. 2725.00 and 2.53:1 respectively, whereas with respect to banana papads, net returns and benefit cost ratio is Rs. 5716.00 and 4.85:1 respectively.

Introduction

Banana, a fruit of tropics is one of the most important fruit crops of the world as well as India. Banana (*Musa* spp.) belongs to the family Musaceae. Banana culture is as old as Indian civilisation. It is known to be one of the earliest fruit crops grown by mankind at the dawn of civilisation. Considering the nutritive value of banana, it is so prominent and popular among the people of India that it is liked by both poor and rich alike. Banana is also called "poor man's apple" as it is the cheapest among fruits grown in the country with good energy and nutritive values. It is also popular on account of its year round availability as compared to seasonal availability of other fruits (Chadha, 2001).

The post-harvest losses in fruits like banana are high in a tropical country like India. These losses have been attributed to improper handling, transport, marketing and processing (Sethi *et al.,* 1987). Banana being a highly perishable fruit, suffers from high post-harvest losses to the extent of about 30 to 40 per cent (Salunke and Desai, 1984). Under these circumstances, it is necessary to develop shelf stable products, such as banana powder, flour, chips, dried slices, jam, beverages, baby

foods, etc (Patel *et al.,* 1999). Several indigenous traditional savoury preparations are being manufactured and extensively consumed in India. Among them, papad and crisps are an important food adjunct (Kulkarni *et al.,* 1996).

Among the several techniques available for preservation or processing of banana, dehydration is widely adopted technique for banana. Banana processing industry improves the capabilities of rural communities to increase their productivity, access more lucrative markets, and obtain shares in marketing and processing activities as a means of obtaining larger share of the value in the chain. In this context and on the premise of promoting the development of the banana industry that benefits the poor in rural and urban areas. With this connection a study was conducted to study the recovery percentage, cost of investment and returns of banana processing products like banana crisps and banana papads.

Materials and Methods

Healthy, mature, unripe banana bunches were procured from the orchard of AICRP on Tropical Fruits, K.R.C. College of Horticulture in 2010-2011, Arabhavi.

Preparation of dehydrated banana crisps

This experiment was conducted in the month of August to January 2010-11. Healthy, matured fruits were washed in tap water, peeled and cut into slices of 2 mm thickness. The slices were subjected to various pre treatments.

Sulphuring was done in the sulphuring chamber of 18 cft volume. Elemental sulphur at the rate of 2g/kg fruit (Mahajan, *et al.,* 2010) was taken on a pad of cotton placed on a saucer which inturn was placed in the bottom of the chamber. Shutter was closed after firing the cotton. Banana slices were kept in the atmosphere of sulphur dioxide for the required duration of 30 minutes. Thereafter, fumigated slices were immersed in 0.5 per cent $CaCl_2$ for 10 minutes.

KMS pre-treatment was given by immersing banana slices in 0.5 per cent solution for 30 minutes (Ravi, 2010) followed by frying in ground nut oil and thereafter dipping in sugar syrup of 60°B with one per cent citric acid for 12 hours.

The banana slices after imposing the treatments as described above were spread on the trays and dried in an electric tray drier at temperature of 65°C. Drying was continued till a constant weight of crisps was obtained in each treatment. Dehydrated banana crisps (sweetened dehydrated banana chips or slices) were packed in 200 gauge polyethylene bags and stored in a cool and dry place for further study.

Methodology for preparation of papads

Bananas (matured) with skin steamed in pressure cooker for nine (without peel) to eleven whistles (with peel) and thereafter peeled and immediately ground in a mixer grinder to paste form. Before going to grinding Papad masala was added at the time of grinding at the rate of 10 g per kg of pulp. The paste was rolled into balls of uniform size. The balls were placed between two polyethylene strips smeared with oil and pressed with the help of papad press. Papads were kept on a mat / cloth for sun drying with bottom PE strip attached to it. After about three hours of drying, the strip was freed from dried papads. The dried papads were then rehumidified to flatten by spreading on clean cement flour for one hour and packed in polyethylene bag and sealed for further evaluation in the laboratory.

Table.1 Economics of production of banana crisps

Sl. No.	Particular	Amount (Rs.)
Expenditure details		
1.	Cost of 100 kg banana fruits @ Rs. 5/kg	500.00
2.	Cost of sugar (10 kg x Rs. 40/kg)	400.00
3.	Cost of chemicals (KMS-300 g @ Rs. 250/kg, citric acid-500 g @ Rs. 100/kg)	125.00
4.	Electricity charges (per unit @ Rs. 5 for 40 hours)	200.00
5.	Cost of packaging and sealing (0.5 kg packs 100 nos., 50 ps/pack)	50.00
6.	Cost of labour (@ Rs. 100/day, 4 nos.)	400.00
7.	Miscellaneous charges	100.00
	Total:	1775.00
Returns details		
1.	Recovery of dried crisps	45 kg
2.	Gross returns @ Rs. 100/kg	4500.00
3.	Net returns (4500– 1775)	2725.00
4.	**Benefit cost ratio**	2.53:1

Table.2 Economics of production of banana papads

Sl. No.	Particular	Amount (Rs.)
Expenditure details		
1.	Cost of 100 kg banana fruits @ Rs. 5/kg	500.00
2.	Cost of steaming and grinding (10 hours)	100.00
3.	Cost of ingredients (600 g papad masala, Rs. 30/100 g)	180.00
4	Cost of chemicals (KMS-300 g @ Rs. 250/kg, citric acid-500 g @ Rs. 100/kg)	150.00
5.	Cost of labour (@ Rs. 100/day, 4 labours)	400.00
6.	Cost of packaging (200 g pack, 0.25 ps per pack)	54.00
7.	Miscellaneous charges	100.00
	Total:	1484.00
Returns details		
1.	Papad recovery 36 kg (5g/papad)	7200 papads
2.	Gross returns (Rs. 1.00/papad)	7200.00
3.	Net returns (– 1484)	5716.00
4	**Benefit cost ratio**	4.85:1

Fig.1 Graph showing recovery percentage of banana crisp and Papad
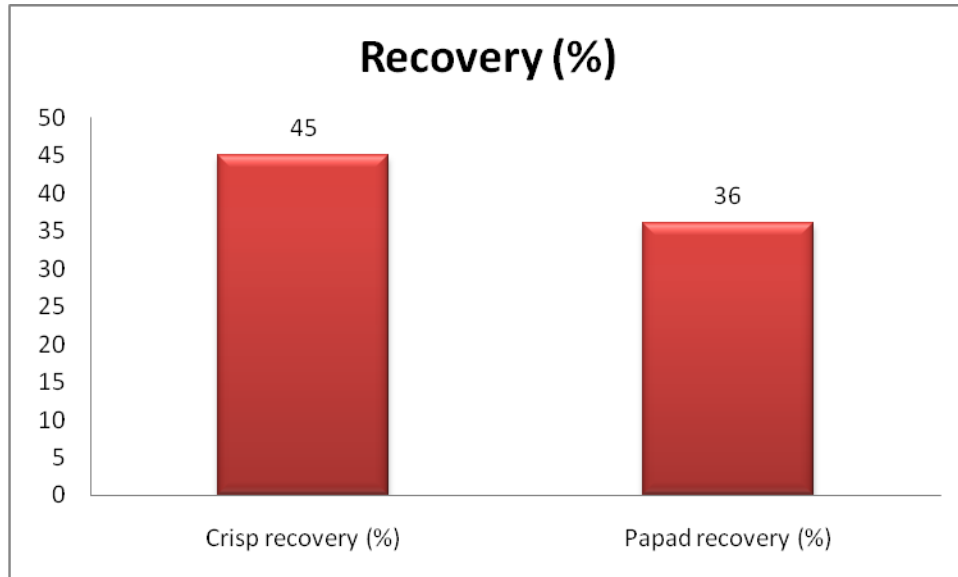
In case of pre-treatment first peeled the raw mature banana and make in to vertical section and spread on perforated trays and these trays are placed in fumigation chamber, concentration of sulphur powder is 2g/kg slices for 30 minutes and thereafter go for steaming process. The expenditure and returns details of banana crisps and papad were calculated on the basis of what we spent and also recovery percentage also calculated after dehydration process of banana papads and crisps.

The recovery of crisps or papad from banana was worked out immediately after drying and before packing by taking the weight of fresh slices or pulp balls and weight of dried crisps or papad.

Crisps or papad recovery (%) = $\dfrac{\text{Dried crisps or papad weight}}{\text{Fresh slices or pulp weight}} \times 100$

Benefit cost ratio

Benefit cost ratio was calculated based on following formulae

B: C ratio = $\dfrac{\text{Gross Income}}{\text{Gross investment}}$

Results and Discussion

The average recovery of banana crisps is 45kg for every 100kg of banana (Fig. 1). This recovery of banana crisps combined with osmotic process during pre-treatment leading to rise in infused sugar level in addition to differences in complex biochemical composition of the banana might have been the reasons for good crisps recovery. Increased recovery of osmotically dehydrated product has also been reported by Kanthakumari and Maheswari (2006) in grapes, Sharma *et al.,* (2004) in apricot. In case of gross returns per 100 kg of banana (Rs. 4500/-), investment (Rs. 1775/-) and Net returns (Rs. 2725/-), and BC ratio is 2.53:1.

The average recovery of banana papad is 36 kg for every 100kg of banana (Fig. 1). In case of gross returns per 100 kg of banana (Rs. 7200/-), investment (Rs. 1484/-) and Net returns (Rs. 5716/-), and BC ratio is 4.85:1. The results shown that banana processing

industry is remunerative and also act as commercial enterprise to rural youth. This industry improves the capabilities of rural communities to increase their productivity, access more lucrative markets, and obtain shares in marketing and processing activities as a means of obtaining larger share of the value in the chain. In this context and on the premise of promoting the development of the banana industry that benefits the poor in rural and urban areas (Table 1 and 2).

Among the several techniques available for preservation or processing of banana, dehydration is widely adopted technique for banana. Banana processing industry improves the capabilities of rural communities to increase their productivity, access more lucrative markets, and obtain shares in marketing and processing activities as a means of obtaining larger share of the value in the chain.

References

Chadha, K.L., 2001, Horticulture industry in India. In *Handbook of Horticulture*. Ed. Chadha, K.L., Directorate of Information and Publication of Agriculture, ICAR, Krishi Anusandhan Bhavan, Pusa, New Delhi, pp. 4.7.

Kanthakumari, N. and Uma-Maheswari, K., 2006, Physico-chemical and sensory quality of raisins prepared from two varieties of grapes by different drying methods. *J. Food Sci. Technol*., 43(2): 173-176.

Kulkarni, S.G., Manan, J.K., Kishorilal, Agaral, M.D. and Shukla, I.C., 1996, Physico-chemical characteristics of commercial spiced papads. *J. Food Sci. Technol.*, 33(5): 418-420.

Mahajan, B. V. C., Tajendra, K., Gill, M. L. S., Dhaliwal, H. S., Ghuman, B. S. and Chalil, B. S., 2010, studies on optimization of ripening techniques for banana. *J. Food Sci. Technol*. 47(3): 315-319.

Patel, P.M., Siripurapa, S.C.B. and Shah, B.P., 1999, Post-harvest practices and processing of banana for better returns. *A. Rev. Agric. Engg.*, 23(3-4): 51-57.

Ravi, P. P., 2010, Processing of banana in to crisps and papads. *M.Sc. (Hort.) Thesis*, Univ. Agric. Sci., Dharwad.

Salunkhe, D.K. and Desai, B.B., 1984, Post-harvest biotechnology of fruits. *Baca Raton*, FL: CRC, 1: 168.

Sethi, V., Mani, S.B. and Anand, J.C., 1987, Reducign post-harvest wastage of fruits and vegetables for proper marketing. *Bev. Food World*, 14(9): 34-40.

Sharma, K.D., Kumar, R. and Kaushal, B.B.L., 2004, Mass transfer characteristics, yield and quality of five varieties of osmotically dehydrated apricot. *J. Food Sci. Technol*., 41(3): 264-275.