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Screening of Dwarf Cavendish (AAA) banana varieties for chips production

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ABSTRACT

The present study was conducted at Banana Research Station, Jalgaon, Maharashtra during 2013-15 with the objective to find out a suitable variety for quality banana chips. Five banana varieties from Dwarf Cavendish group (AAA) viz Grand Naine, Shrimanti, Basrai, Harsaal and Mahalaxmi were selected. Higher chips recovery per kg was recorded with cv Shrimanti (196.00 g) followed by Basrai (180.25 g) and Grand Naine (177.00 g) which were on par with one another. In respect of colour, Shrimanti, Basrai and Grand Naine recorded score more than mean. For firmness of chips, the scores recorded by Shrimanti, Basrai and Harsaal were in descending order. The cultivar Shrimanti and Basrai recorded their superiority for crispness and appearance. For overall acceptability the cultivars Shrimanti and Basrai were found better than rest of the cultivars studied.

Keywords: Banana; variety; chips; oil content; sensory evaluation

INTRODUCTION

In India the production of banana was 30,460 thousand MT from an area of 866 thousand hectares in 2019 (Anon 2019). Banana is available throughout the year. Its consumption rate is higher than any other fruit. It is one of the cheapest, delicious and most nourishing of all fruits. It is preferred by people of all ages. The fruit constituents mainly are carbohydrates, minerals and water and thus it is a rich source of energy. It has also several medicinal properties. Banana is a perishable fruit and considerable amount of it is spoiled. The perishability of the fruit is attributed to immense physiological changes after harvest (Momen et al 1993). The magnitude of postharvest losses in fresh fruits including banana in Maharashtra was 25-50 per cent (Amiruzzaman 1990) whereas it was only 5-25 per cent in developed countries (Kader 2002).

Chips are the most popular snack item in many fast food outlets. Fried banana chips are one of the important potential banana products in Maharashtra. Banana chips are also easily saleable snack food in the markets. For longer shelf-life, crispiness and chips quality, moisture content is the most important factor as far as storage stability is concerned. Bacteria and other microorganisms cannot grow easily in lower percentage of moisture content in chips. Visual colour is the major quality criterion for determining the commercial quality with respect to consumers preferences and cost of the chips (Anand et al 1982). Packaging and storage conditions are the important quality control factors of chips preservation. Storage stability depends on packaging. Good packaging and storage conditions extend the storage duration of chips.

Keeping this in view the study was undertaken to find out the processing technique, packaging and quality aspect of chips from banana varieties and reduce postharvest losses and thus suggest ways and means for production of good quality banana chips.

The main cultivars of banana in Maharashtra are from the Dwarf Cavendish group. Currently there is very limited commercial processing of bananas. Most people consume bananas fresh, steamed or boiled. During bumper harvests, farmers sell bananas at give-away prices and considerable quantity goes waste. Processing of banana to chips may add value to this fruit and reduce the wasted banana. As banana is consumed as a fresh fruit in Maharashtra, through processing it is possible to obtain dried bananas often called banana chips which can be consumed as a snack

and can provide extra nutrients and calories. The technology would be helpful to develop cottage industry and to generate employment among rural youth and women.

MATERIAL and METHODS

The experiment was conducted at the Banana Research Station, Jalgaon, Maharashtra. Fully mature fruits of Grand Naine, Basrai, Shrimanti, Harsaal and Mahalaxmi were collected from the farm. Tasting salt, KMS, palm oil, knife, saucepan and spices were used in the experiment.

Chips preparation: Fully mature fruits of Grand Naine, Shrimanti, Basrai, Harsaal and Mahalaxmi were taken and washed with clean water. After peeling, the fruits were cut into 2 mm thickness slices. The slices were then weighed, blanched for 3 minutes in water at 95°C and immersed in 0.1 per cent potassium metabisulphite (KMS) for 15 minutes using 2 kg of solution per kg of slice. The dried slices were fried in palm oil and stirred with narrow wooden stick. When these slices turned to light yellow in colour these were taken out of the saucepan. The prepared chips were mixed with salt and spices in a bowl. The processed product was packed in different packaging materials. The medium density polyethylene pouches were stored at ambient temperature (28-32°C). The flow diagram of preparation of fried banana chips (Molla et al 2009) is shown in Fig 1.

Sensory evaluation

Sensory evaluation of the freshly prepared and stored chips was done by taste testing panels. The taste testing panels consisted of 10 panelists. They were asked to evaluate the appearance, crispiness, taste, flavour, colour and overall acceptability by a scoring rate on a 9-point Hedonic scale where 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 and 1= Dislike extremely.

RESULTS

Five table purpose banana varieties from Dwarf Cavendish group (AAA) were used for their suitability as chips. The data on five varieties with respect to average fruit weight, peeling losses, pulp to chips recovery and yield of chips per kg of fruit have been depicted in Table 1.

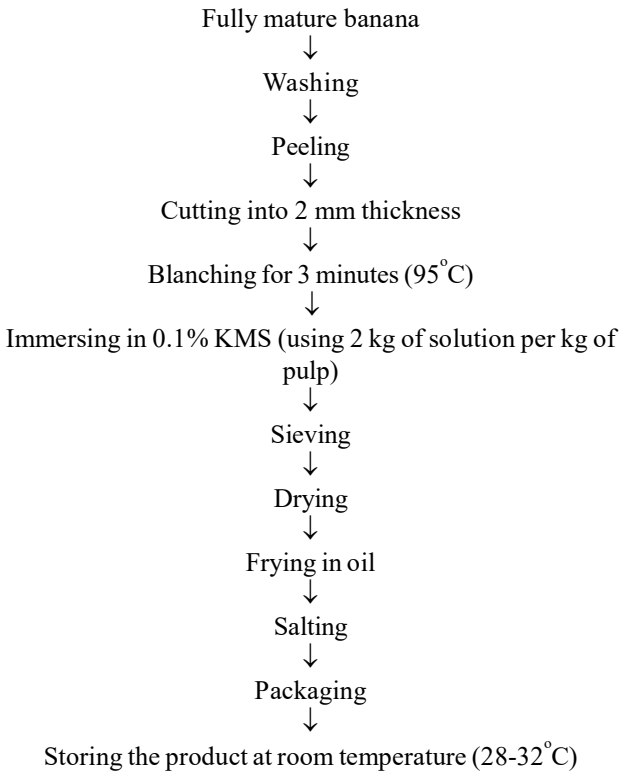

Fig 1. Flow diagram for the preparation of fried banana chips

Chips recovery: The cultivars recorded peeling losses in the range of 39.60 to 44.36 per cent. The lowest peeling loss was recorded in cv Shrimanti (39.60%). All cultivars under study were having white colour pulp. The pulp to chips ratio recorded was in the range of 26.32 to 32.52 per cent. The maximum (32.52%) pulp to chips ratio was recorded in cv Shrimanti and it was the least in Harsaal (26.32%).

Yield of chips per kg of fruit was recorded in the range of 147.25 to 196.00 grams and the highest yield (196.00 g) was recorded in cv Shrimanti followed by Basrai (180.25 g) and Grand Naine (177.00 g) and minimum in Harsaal (147.25 g).

Sensory evaluation: The chips prepared from the cv Shrimanti recorded their superiority for colour, firmness, crispness, general appearance and overall acceptability. The cv Basrai was found second best for these traits.

The data on mean score for crispiness, colour, taste, flavour and overall acceptability of stored chips prepared from different banana varieties are shown in Table 2. The DMRT test revealed that the colour of the chips prepared from Shrimanti

Table 1. Suitability of Dwarf Cavendish banana (AAA) cultivars for chips production (pooled mean of 2012, 2013 & 2014)

Treatment (variety)	Average fruit weight (g)	Peeling loss (%)	Pulp to chips ratio (%)	Yield of chips/kg of fruit (g)
T_1: Grand Nain	140.32	42.63	31.15	177.00
T_2: Shrimanti	143.23	39.60	32.52	196.00
T_3: Basrai	129.10	41.26	30.80	180.25
T_4: Mahalaxmi	115.85	43.76	28.62	158.75
T_5: Harsaal	110.75	44.36	26.32	147.25
SE±	6.51	0.97	1.11	7.19
$CD_{0.05}$	20.05	2.98	3.42	22.17

Table 2. Sensory evaluation of chips of different banana (AAA) cultivars

Treatment (variety)	Colour	Firmness	Crispness	General appearance	Overall acceptability
T_1: Grand Nain	6.94	6.48	6.63	6.81	6.63
T_2: Shrimanti	7.31	7.34	7.22	7.42	7.13
T_3: Basrai	7.30	7.11	7.29	7.14	7.20
T_4: Mahalaxmi	6.31	6.50	6.53	6.52	6.48
T_5: Harsaal	6.62	6.87	6.76	6.65	6.76
Mean	6.90	6.86	6.89	6.91	6.84

variety secured the highest score over the chips of other varieties. But no significant difference was found between the colour preference of the chips prepared from the varieties Grand Naine, Harsaal and Mahalaxmi.

Crispiness of the stored chips prepared from the cvs Shrimanti and Basrai was preferred among chips of different varieties tested. Mahalaxmi scored the least value for crispiness. The taste, flavour and overall acceptability of the stored chips of different banana varieties did not differ statistically with one another.

Considering the appearance of visual colour, chips prepared from Shrimanti were found most suitable for their bright colour. During two month storage based on taste testing panel no statistical difference was found among the prepared chips from Basrai and Shrimanti for their crispiness, taste, flavour and overall acceptability.

Economics: The data given in Table 3 show that maximum net monetary income of Rs 736.50 per quintal with B-C ratio of 1.34 was exhibited by cv Shrimanti followed by Grand Naine with net monetary income of Rs 641.00 and B-C ratio of 1:30.

Table 3. Economics of banana cultivars (AAA) for chips

Treatment (variety)	Chips recovery (kg/q)	Cost of production (Rs/q)	Gross monetary income (Rs/q)	Net monetary income (Rs/q)	B-C ratio
T_1: Grand Nain	14.03	2,165.0	2,806.00	641.00	1.30
T_2: Shrimanti	14.32	2,127.5	2,864.00	736.50	1.34
T_3: Basrai	12.91	2,127.5	2,582.00	454.50	1.21
T_4: Mahalaxmi	11.58	2,127.5	2,316.00	188.50	1.08
T_5: Harsaal	11.07	2,165.0	2,214.00	49.00	1.02

CONCLUSION

The preparation of banana chips is very simple and banana can easily be processed in rural areas where modern facilities of processing do not exist. Many food industries also can adopt the procedure for medium and large scale processing. Establishment of small scale processing units at growers' level can utilize the banana for processing of chips which would ultimately contribute to minimize postharvest losses of banana and generate income to the growers. Banana chips have a high market potential particularly when wasted banana is concerned. It represents a different source of nutrients well characterized by its mineral nutritional value and reasonable energy supply.

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