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Full Length Research Paper

Nsukka yellow pepper processing and preservation techniques among women farmers in Enugu State

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Pepper belongs to the group of crops commonly referred to as perishables. In their fresh form under hot tropical conditions, they suffer extensive deterioration within a short time after harvest. Thus, a great % is lost through spoilage. A palatability test was carried out on Nsukka yellow pepper after processing, preserving and storing for 3 months by women farmers in the 3 agricultural zones of Enugu State. The sample size of 120 women farmers were randomly selected for the study. Data were collected using structured questionnaire. Descriptive statistics and analysis of variance (ANOVA) were employed in data analysis. The study revealed that production of Nsukka yellow pepper is a major agricultural activity for women in the state. Middle aged women were involved in the production, processing, preservation and marketing of the yellow pepper, irrespective of their educational levels. The study also revealed that yellow pepper can be produced, processed and preserved in any of the 3 agricultural zones of the state without compromising its flavour and fruit colour. Thus, there was no significant difference between the tested attributes in the 3 zones. The processing and preservation techniques of yellow pepper were generally accepted by the women farmers. However, steam–blanching/salting/sun-drying (BT_1) technique was rated best while salting/sun drying (ST_2) technique was rated second best in the overall acceptability.

Key words: Nsukka, yellow pepper, processing, preservation, women.

INTRODUCTION

In Nigeria, pepper occupies the third place of importance among cultivated vegetables (Uzo, 1983). However, Nsukka yellow pepper is an important commercial fruit vegetable. Its cultivation forms a major and sometimes the only agricultural activity of rural women in Enugu state. Tanko (1995) and Quisumbizo et al. (1996) des-cribed these women as invisible workforce of the family and national economy. The plant is usually planted from seeds which are extracted from ripe fruits, dried and stored until required for planting. They are usually grown as a rain-fed crop and are always green at maturity but deep yellow or orange variety has also evolved (Uguru, 1996, 2005). It is an important spice crop that is produced and consumed either fresh or processed (Madu et al., 2005). The pepper is used as pungent spice for flavouring stew, soup and sauces. It is a rich source of vitamins A and C (Uzo and Williams, 1989). It has both nutritive and medicinal values, hence, it is used by the food manufacturing industries for the seasoning of processed food. It is also used by the pharmaceutical industries in the preparation of stimulant and counter irritant balms for external application (Bosland and Votava, 2000) . This is because yellow pepper is very aromatic and this attribute makes it costly in the market (Nwankiti, 1981; Abu and Uguru, 2005). Unfortunately, pepper belongs to the group of crops commonly referred to as perishables (NSPRI, 2000). In their fresh form under hot tropical conditions, they suffer extensive deterioration within a short time after harvest. Consequently, large amount of the yellow peppers are produced annually, but a great percent is lost through spoilage caused by high respiration and transpiration rates, in addition to bacteria and fungal attack and also due to lack of hard texture which make them bruise easily (NSPRI, 2000). In addition, market and industry require pepper all

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the year round but production supply are seriously constrained by post harvest losses. Thus, there is need to process and preserve Nsukka yellow pepper throughout the year just like the processed Cameroon pepper which many women prefer to buy despite the cost. In view of the post harvest losses, 2 techniques of processing and preservation of the yellow pepper namely, salting/steam-blanching/sun-drying and salting/sun-drying were availed to rural women farmers. The general issue in this study was to evaluate the processing and preservation techniques of Nsukka yellow pepper among women farmers in Enugu state.

The specific objectives of the study were to evaluate the sensory quality of the pepper after processing and storing for 3 months and the degree of acceptability of the processing and preservation techniques by the women farmers.

MATERIALS AND METHODS

The study was carried out in Enugu state, Nigeria. A total of 120 women farmers were randomly selected from a list of Enugu state, ADP contact farmers. Yellow pepper was harvested, processed and preserved by 2 processing techniques namely, Steam–blanching/ salting/sun-drying (BT_1); and salting/sun-drying (ST_2). A palatability test was carried out after the pepper was stored for 3 months, to evaluate its peculiar attributes (colour, taste, flavour and aroma). A structured questionnaire was used for data collection. Palatability rating of best = 3 points, better = 2 points and good = 1 point rating scale was assigned. Also, the economic impact of the steam-blanching and salting techniques on household sustenance before and after the techniques was evaluated. Information such as adequacy of household food intake, frequency of eating in a day and their human capital assets were also collected. Data was analyzed using frequency counts, percentage, mean and analysis of variance (ANOVA). Means were separated according to Okporie (2006).

RESULTS AND DISCUSSION

Personal characteristics of the respondents

The study revealed that the majority (71.6%) of the women involved in yellow pepper production, processing and preservation were between 30 - 39 years of age. Nevertheless, the mean age was 38 years. Thus, middle aged women adopted the techniques of processing the yellow pepper. Akubuilo, (2004) opined that age correlates with adoption (Table 1). The findings also revealed that majority (84.2%) were married with no formal education (52.5%), however, they had acquired enough experience in pepper production and processing. Furthermore, the study revealed that the intensive cultivation (63.3%) of yellow pepper irrespective of levels of education was attributed to its economic value and variety of uses.

The study revealed that women were involved in nearly all the activities required in pepper production, processing and preservation, especially in planting (2.9), weeding (2.9), harvesting (2.9), transportation (2.8), utilization (2.8), preservation (2.7) and farm-gate marketing (2.7) of the pepper (Table 2). This was attributed to women's current efforts to sustain household food security. Earlier studies by Popohunda (1995) and Obieri (2003) revealed that women had been performing tasks such as land clearing, planting, weeding, harvesting and some of the male stereotyped farming operations.

The study revealed that the 4 tested qualities (colour, taste, flavour and aroma) were rated above the mean of 2.00. This is an indication that there is no location effect on the qualities of the yellow pepper (Table 3). Thus, the qualities were accepted across the zones.

The study revealed that there was a significant difference ($p = 0.05$) in the flavour and aroma of the pepper after treatment (Table 4); although not across the zones. This means that location had no effects on the quality attributes of yellow pepper but the processing technique had. Consequently, BT_1 and ST_2 were perceived best and second best respectively among the 3 treatments. Unfortunately, without proper processing of fresh peppers there will be a lot of economic wastages within a short time after harvest (NSPRI, 2000). The study further revealed that the majority (52.5%) of the respondents use the salting / sun-drying technique (ST_2) even though the steam-blanching/salting /sun-drying (BT_1) technique was rated best in the overall acceptability (Table 5). However, 34.17% of the respondents use the BT_1 technique and 13.33% still use FT_3 technique of storing under the shade not minding the economic wastage.

This suggests that ST_2 technique is easier than BT_1. BT_1 seemed to be more labour intensive due to the steam-blanching aspect. Nevertheless, BT_1 remains the best processing and preservation technology for Nsukka yellow pepper since it retains all the sensory qualities of the pepper.

Economic impact of the steam-blanching/salting techniques on household sustenance

The study revealed that the majority (80.8%) of the women considered their family's food intake to be adequate (Table 6). Consequently, about (65.83%) of the respondent eat thrice in a day (Table 7). This implies that the improvement in the technological efficiency of production, processing and preservation of the yellow pepper had improved their financial efficiency and food security.

The result in Table 8 showed that, there is a significant difference ($p = 0.05$) between the women' economic welfare in terms of savings and assets after the introduction of steam-blanching/salting technologies. Thus, revealing that there was improvement in the level of income after the introduction of steam-blanching and salting techniques. This wealth creation was shown in human capital assets such as household items (radio, chairs tables, bicycles, motor-cycles cooking utensils etc), livestock, payment of school fees and savings in social organizations. Unfortunately, the low value of the agricultural implements revealed that use of muscle power, en-

Table 1. Percentage distribution of respondents according to personal characteristics (n = 120).

Social economic variables	No of respondent	Percentage mean
Age (Years)		
20-29	3	2.5
30 - 39	86	71.6
40 - 49	23	19.2 , 38
50 and above	9	6.7
Marital status		
Married	101	84.2
Widowed	19	15.8
Level of education		
No formal education	63	52.5
Primary	32	26.7
Secondary	17	14.1
Tertiary	8	6.7
Farming experience (years)		
1 - 10	21	17.5
11 - 20	57	47.5
21 - 30	33	27.5
31 - 40	9	7.5 , 18
Size of farm (hectare)		
1 - 2	44	36.7
3 - 4	76	63.3, 2.8

Table 2. Mean distribution of response according to task performed by women in pepper production, processing and preservation.

Ac/operation	More frequently	Frequently	Not frequent	Mean
land clearing	60	48	12	2.4
Ridging/mound making	41	50	9	1.9
Planting/ transplant	112	6	2	2.9
Weeding	111	6	3	2.9
Fertilizer/compost application	56	48	34	2.3
Harvesting	109	10	0	2.9
Transportation	92	26	2	2.8
Utilization	101	19	0	2.8
Processing/preservation	91	25	4	2.7
Farm-gate marketing	88	30	2	2.7

Table 3. Mean of the sensory qualities of Nsukka yellow pepper.

Zone	Colour	Taste	Flavour	Aroma
Enugu west	2.53	2.43	2.40	2.20
Enugu east	2.53	2.52	2.65	2.47
Enugu north	2.46	2.61	2.66	2.53

p= 0.05 level of Signififcant.

Table 4. Mean perception of treatment effect of Nsukka yellow pepper.

Treatments	Colour	Taste	Flavour	Aroma
BT_1	2.52	2.69	2.81	2.93
ST_2	2.48	2.50	2.64	2.49
FT_3	2.51	2.37	2.25	1.78
FLSD = 0.05	-	-	0.20	0.34

Table 5. Percentage distribution of the responses of usage of steam- blanching and salting technique by the women farmers using them n = 120.

Treatments	Enugu west zone	Enugu west zone	Enugu west zone	Total	%
BT_1	12	10	19	41	34.17
ST_2	15	17	31	63	52.50
FT_3	3	5	8	16	13.33
Total	30	32	58	120	100.00

Table 6. Percentage distribution of respondents according to adequacy of household food intake n = 120.

	Frequency	%
Adequate	97	80.8
Not adequate	21	17.5
Cannot tell	2	1.7
Total	120	100.0

Table 7. Percentage distribution of respondents according to frequency of eating in a day. N =120.

Number in a day	Frequency	%
Once	-	-
Twice	5	4.17
Thrice	79	65.83
More than thrice	36	30.0
Total	120	100.00

Table 8. Economic impacts of processing techniques on household sustenance.

Average total value (₦) of household assets:			
	Before awareness	After awareness	t- value
Household assets - (radios, chairs, tables, kitchen utencils)	28,555.90	46,251.60	2.58*
Livestock	5,432.00	7,328.00	2.98*
Agricultural implement	1,865.10	1,311.79	ns
Children's school fees	49,277.00	78,184.00	1.73*
Savings in social organizations (isusu)	6,292.00	10,991.70	2.82*

suring drudgery in yellow pepper production was rife in the study area.

Conclusion and Recommendations.

From the study, it could be deduced that Nsukka yellow pepper has become very important in Enugu state that its production forms a major and sometimes the only agri-cultural activity of many rural women in the state. This is because through the year round production of Nsukka yellow pepper, these women have ensured household food security and self-reliance. The result also shows that the pepper can be grown, processed and preserved in any of the agricultural zones of Enugu state without compromising flavour and fruit colour. In other worlds, location, weather or environmental factors have no effects on the colour, taste, flavour and aroma of yellow pepper but the processing and preservation technique may have. Hence BT_1 was best preferred and recommended, followed by ST_2. FT_3 was the least preferred of the preservation techniques. Thus, the study recommends blanching and/or salting and sun drying as effective means of processing and preserving the yellow pepper. It also confirms that blanching and/or salting and sun drying has considerable advantage on the preservation of the flavour and aroma qualities peculiar to the pepper than the farmers' practice of storing freshly harvested pepper under shade. Sequel to this, the women-in-agriculture (WIA) component of the ENADEP should create-more awareness of the processing and preservation options through radio and television to avail more women the practical knowledge of preserving peppers so as to take great advantage of its income generating potentials to alleviate poverty among the rural poor, just like the popular Cameroon pepper which many women now prefer to Nsukka yellow pepper, despite the fact that a small quantity of it cost much more than the yellow pepper. This is because it has already been processed and as such it can be preserved for a longer period of time without spoilage unlike freshly sold Nsukka yellow pepper.

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