Performance of Different Sweet Potato Varieties as Perceived by the Farmers

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Abstract

The objectives of this study were to assess and describe some selected characteristics of the sweet potato farmers, to determine the extent of performance of farmers on sweet potato cultivation; to explore the relationship between the selected characteristics of the farmers with performance of different sweet potato varieties and to compare severity of the problem of the performance of different sweet potato varieties. The survey was conducted on 102 randomly selected farmers in four upazilas of bangladas in four districts. We collected data from respondents from January 20, 2019 to February 20, 2019, using a pre-tested interview schedule. The performance of various sweet potato cultivars was the dependent variable, which was measured by variables measured based on tonnes of yield per hectare. Farmers' achievements in sweet potato cultivation were measured by performance. We selected 11 characteristics of the performance of various sweet potato varieties and the respondents' relationships to the independent variables of the survey. The majority of sweet potato varieties (61.8%) had moderate performance and 20.6% had poor performance. Five characteristics of the respondents, namely. Knowledge of education, training, tolerance, exposure to expansion, and cultivation of sweet potatoes was significantly positively associated with the performance of various sweet potato cultivars. However, age, family size, sweet potato acreage, BCR, commercialization, and sweet potato cultivation issues were not significantly associated with the performance of various sweet potato cultivars.

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Introduction

Sweet potatoes are a highly nutritious food. In one medium spud, you will get over 400% of your daily vitamin A requirement. Sweet potatoes also contain a high amount of fiber and potassium. Sweet potatoes can play an important role in Bangladesh's food security (Hossain and Siddique, 1985). Total production of sweet potatoes in Bangladesh increased from 92,479 tonnes to 104,000 tonnes between 2000 and 2013 (FAOSTAT, 2014). This is due to the introduction of high quality varieties and the adoption of the latest farming methods by farmers. Sweet potatoes are one of the most important food crops in terms of calorie per acre (Scott et al., 1992). Sweet potatoes are characterized by their high yield, their palatability, and their crude protein content. Orange pulp sweet potato varieties are rich in beta-carotene, and purple pulp varieties are rich in anthocyanins. These two important antioxidants are thought to prevent chronic heart disease and cancer (Teow et al., 2007). Increased availability of beta-carotene (provitamin A) and crude protein content are good for nutrition and health (Ukom et al., 2009). Sweet potato, *Ipomoea batatas* L. is dicotyledonous plant belongs to Convolvulaceae, is native to tropical American , to are scattered (O'Brien, 1972; Lusweti, 1994). Sweet potato is one of the most important food crops in the world, rank 7th place (based on total production), is cultivated at 100 is the most at 4 than is the 5th most important term of consumption in developing countries. It grows well in different types of soil, with minimal fertilizer and pesticide use, and yields higher than grains (Onwueme, 1978). It is cultivated in East Africa under a variety of environmental conditions (Onwueme, 1978). It rarely fails unfavorable weather conditions and overall crop therefore farmers plant it as insurance crop (CIP, 1996). Sweet potato tubers are a source of carbohydrates, the leaves contain protein and vitamin C, and the orange flesh tubers provide vitamin A. Alcohol and Animal Lining (Woolfe, 1992). Sweet potatoes are a potential source of biofuel and plastic (anonymous, 2007). Sweet potato is a nutritious food crop that enables better and faster production with less effort under a variety of agro ecological conditions and has great potential to combat malnutrition and poverty (CIP, 2008). Out of added benefits of sweet potatoes production and nutrition (Guo et al., 2006). Soil salinity is one of the factors limiting the productivity and expansion of sweet potato cultivation in many parts of the world (Dasgupta et al., 2008).

1.1 To assess and describe some selected characteristics of the sweet potato farmers
1.2 To determine the extent of performance of farmers on sweet potato cultivation
1.3 To explore the relationship between the selected characteristics of the farmers with performance of different sweet potato varieties
1.4 To compare severity of the problem of the performance of different sweet potato varieties

Methodology
Locale of the study:
Bogura, Gaibandha, Sherpur and Shariatpur Districs were selected randomly for the study. Shibganj, Gobindoganj, Sherpur sadar and Bhedarganj upazila under Bogura, Gaibandha, Sherpur and Shariatpur districts was selected purposively as the locale of the study respectively.

Population and sampling procedure
Above four districts 102 populations will constitute population of the study. At the rate of 100% the sampling size of population will be determined. Besides this, required percent of the sample size will be selected randomly from the population which will be included in the reserve list supposed to be interviewed only when a respondent in original sample will find unavailable during data collection.

Table 2. Distribution of population and sample of farmers of the selected upazila

Name of the Districts	Name of the Upazila	Population	Sample size
Bogura	Shibgonj	25	25
Gaibandha	Gobindogonj	25	25
Sherpur	Sherpur sadar	28	28
Shariatpur	Vedargang	24	24
Total		**102**	**102**

Data collection instrument
To get accurate and reliable data from the farmers' questionnaire, we will design it with the intention of achieving our objectives. Simple, direct questions and various scales are used to obtain information. Both open and closed questions will be designed to obtain information about the qualitative variable which will be measured by assigning a score.

Measurement Independent Variables
The age of respondents was calculated on the basis of their entire lifetime span. The data was obtained by asking direct questions and was measured in terms of year. The level of education was measured based on the number of years of schooling one received in one year. Family members were measured based on the number of people living with the family. The land of the farmer was measured by the amount of land that he owned. The unit of measurement was decimal. The training exposure score of a respondent was calculated by the number of days the respondent had received training in his or her entire life. Cosmopoliteness was measured by scores. Average return to each taka spent on production was an important criterion for measuring profitability. BCR was estimated as the ratio of total return to total cost per hectare. Cost of sweet potato cultivation of a respondent was measured in thousands taka on the basis of total yearly cost in sweet potato cultivation. A score of 1 (one) was assigned for the cost of one thousand taka. Income of a respondent was measured in thousands taka on the basis of total yearly earnings from sweet potato cultivation. A score of 1 (one) was assigned for the income of one thousand taka. BCR was measured by using following way income from Sweet Potato Cultivation/Cost of sweet potato cultivation Commercialization score of a farmer was determined on the basis of value of crops sold out of the total value of crops raised. As used by Karim and Mahboob (1974), the following formula was followed in computing the commercialization score of a farmer:

$$\text{Commercialization} = \frac{\text{Value of sold crops}}{\text{Total value of raised}} \times 100$$

Extension media contact was measured by scores. Knowledge of the farmers on sweet potato cultivation was measured by asking 10 selected questions related to sweet potato cultivation. A full score of 2 (two) was assigned for each correct answer and 0 (zero) score was assigned for the wrong or no answer. Partial score was assigned for partially correct answer. Problems faced in sweet potato cultivation were measured by scores.

Measurement of Dependent Variable
Performance of different sweet potato varieties as perceived by the farmers was the dependent variable of the study. Performance of different sweet potato varieties as perceived was measured by tons per hectare.

Collection of Data
The Agriculture Extension Officer of four Upazila with his officials cordially helped the investigator to collect the data. Data were collected during January 20 to February 20, 2019.

Data Analysis Procedure

Data were gathered, coded, collected, and analyzed in accordance with the study's goals. The date analysis was carried out using the computer program SPSS. The data were described using descriptive statistics such number and percent distribution mean, standard deviation, range, and rank order. The Pearson Product Moment correlation coefficient was calculated to ascertain the association between the farmers' chosen socioeconomic and personal qualities and the performance of several sweet potato cultivars as perceived by the farmers. A 0.05 and 0.01 level of probability with 100 degrees of freedom was employed throughout the study to rule out any null hypothesis.

Results and discussion
Characteristics of the sweet potato farmers

Table 3. Characteristics profile of the respondents

Variables with measuring unit	Rang		Categories	Respondents		Mean	SD
	Minimum	Maximum		Number	Percent		
Age (years)	29	70	Young (up to 35) Middle (36-50) Old ((> 50)	20 66 16	19.6 64.7 15.7	43.33	8.168
Level of education (schooling years)	.00	18.00	Illiterate (0) Can sign only (0.5) Primary (1-5) Secondary (6-10) Above secondary (>10)	6 28 24 30 8	5.9 27.5 21.6 37.2 7.8	5.52	4.86
Family member (number of members)	2	15	Small family (Up to 3.66) Medium family (3.67-8.14) Large family (>8.15)	30 63 9	29.4 61.8 8.8	5.90	2.24
Land under sweet potato cultivation (decimal)	11	165	Small land (Up to 17.28) Medium land (17.29 – 83.78) Large land (Above 83.78)	14 71 17	13.7 69.6 16.7	50.33	33.25
Training exposure (Number of days)	0	7	No training (0) Low training (upto 3) Medium training (above 3)	37 38 27	36.3 37.2 26.5	2.18	2.15
Cosmopoliteness (Score)	7	22	Low (Up to 11.51) Medium (11.52-20.33) High (>20.33)	22 56 24	21.6 54.9 23.5	15.92	4.41
BCR	2.10	4.50	Low BCR (upto 2.30) Medium (2.31-3.38) High (Above 3.38)	17 67 18	16.7 65.5 17.8	2.84	.54
Commercialization	87.18	96.88	Low (Up to 90.81) Medium (90.81-95.55) High (>95.55)	16 71 15	15.7 69.6 14.7	93.23	2.40
Extension contact (Score)	9	24	Low (Up to 12.25) Medium (12.26-18.01) High (>18.01)	14 75 13	13.7 73.6 12.7	15.13	2.88
Knowledge on sweet potato cultivation (Score)	12	20	Low (Up to 14.71) Medium (14.72-18.36) High (>18.36)	25 71 6	24.5 69.6 5.9	16.36	1.65
Problems faced in sweet potato cultivations(Score)	21	40	Low (Up to 24.62) Medium (24.62-34.66) High (>34.66)	30 56 16	29.4 54.9 15.7	29.64	5.20

Table 3 shows that the middle-aged group represented the largest proportion (64.7%) of the population, followed by the young age group (19.6%) and the elderly category (15.7%). Table 3 shows that the proportion of respondents who are currently in secondary education is higher than any other category. On the other hand, the illiterate education level has the lowest proportion (5.9%).The

data in Table 3 shows that the proportion of medium-sized families is the highest (61.8%), followed by small families (29.4%). Table 3 shows that the highest proportion (37.2 percent) of respondents were categorized as having little training, while 36.3 percent were categorized as having no training and 26.5 percent to the category with the received average preparation. The data contained in Table 3 shows that the largest proportion (54.9%) of respondents had an average cosmopolitanity, while (23.5%) and (21.6%) of them had high and low categories of cosmopolitanism. Data from Table 3 suggests that the respondents with medium BCRs are the most common (65.5 percent) followed by those with low BCRs (16.7 percent). The study found that the majority of farmers (69.6%) were in the medium commercialization group, compared to 15.7% and 14.7% who were in the low and high commercialization groups, respectively. The study found that 73.6 percent of the farmers belonged to a medium contact group, compared to 13.7 and 12.7 percent who belonged to low and high contact groups, respectively. The data in Table 3 reveals that most farmers (69.6%) felt they had medium knowledge of sweet potato cultivation, followed by 24.5% who felt they had low knowledge and 5.9% who felt they had high knowledge.

Performance of sweet potato varieties

Performance of sweet potato varieties scores of the respondents observed scores ranged from 16.70 to 26.83 tons/ha. The mean score was 21.15 with the standard deviation 2.71 as shown in Table 4.13. Based on sweet potato varieties of the farmers, the respondents were classified into three categories namely "low performance", "medium performance" and "high performance" as shown in Table 4.

Table 4. Distribution of the respondents according to their performance

Categories	Basis of categorization(tons/ha)	Respondents	
		Numbers	Percent
Low	Up to 18.44 (mean-sd)	21	20.6
Medium	18.45-23.86(mean+sd)	63	61.8
High	Above 23.86(mean+sd)	18	17.6
Total		**102**	**100**

Data contained in the Table 4, indicate that the highest proportion (61.8 percent) of the farmers medium performance while 17.6high performances and 20.6 percent had low performance. Findings show that most (82.4 percent) of the farmers were in the categories of medium to low performance.

Relationships between the selected characteristics of the farmers and performance of different sweet potato varieties

This section deals with the relationships with eleven selected characteristics of the farmers and their performance of different sweet potato varieties. The selected characteristics constituted independent variables and performance of different sweet potato varieties of the farmers considered as dependent variable. Pearson's product moment correlation co-efficient "r" has been used to test the hypothesis concerning the relationship between two variables. Five percent level of significance was used as the basis for acceptance or rejection of any null hypothesis.

Table 5, Co-efficient of correlation showing relationship between selected characteristics of the farmers and performance of different sweet potato varieties

Predicted variable	Experimental variable	Computed value "r"	Tabulated value of "r"	
			at 0.05 level	at 0.01 level
Performance of different sweet potato varieties	Age	0.021^{NS}	0.192	0.251
	Level of education	0.344^{**}		
	Family member	0.055^{NS}		
	Land under sweet potato cultivation	0.178^{NS}		
	Training exposure	0.341^{**}		
	Cosmopoliteness	0.495^{**}		
	BCR	0.045^{NS}		
	Commercialization	0.002^{NS}		
	Extension contact	0.223^{*}		
	Knowledge on sweet potato cultivation	0.235^{*}		
	Problems faced in sweet potato cultivations	-0.019^{NS}		

^{NS} Not significant

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

On the basis of above findings, the null hypothesis could be rejected. Hence, the researcher concluded that education of the farmers had significant and positive relationship with their performance of different sweet potato varieties. Similar findings were also observed by Rahman (1990), Anand and Sohal (1981) and Islam (1997). Thus, it may be concluded that there was significant and positive relationship between extension contact and their performance of different sweet potato varieties. This means the farmers with high extension contact had more positive performance of the potato varieties than the farmers with low extension contact. Hence, the researcher concluded that knowledge on sweet potato cultivation of the farmers had significant relationship with their performance of different sweet potato varieties.

Comparative severity among the Problems faced by the farmers in sweet potato cultivation

The observed Problem Faced Index of the problems ranged from 86 to 283 against the possible range of 0-306. Problem Faced Index (PFI) of the selected problems is shown in Table 6. On the basis of PFI, it was observed that "high price of fertilizers and pesticides" ranked first followed by "farmers do not get proper price", "insect and pest attack", "lack of capital" and "lack of suitable transportation system" were the least problems faced by the farmers sweet potato cultivation.

Table 6, Problem Faced Index (PFI) with Rank Order

Statement on problems	High problem	Medium problem	Low problem	No problem	Score	Rank order
High price of fertilizers and pesticides	87	9	4	2	283	1
Farmers do not get proper price	79	12	4	7	265	2
Insect and pest attack	77	11	6	6	259	3
Non availability of fertilizes	75	10	8	9	253	4
Lack of capital	72	11	9	10	247	5
Late supply of modern variety	68	12	7	16	237	6
Malpractices in the market	62	12	12	16	222	7
Lack of storage facilities	60	10	9	25	209	8
Non availability of pesticides	50	24	5	23	201	9
Adverse climatic condition	47	10	19	26	180	10
Lack of skilled labours	42	22	8	30	178	11
Long chain of middlemen	37	20	12	33	163	12
Lack of contact by the extension workers	28	18	10	46	130	13
Lack of irrigation facilities	20	15	20	47	110	14
Lack of suitable transportation system	10	18	20	54	86	15

Conclusions

In the study area the highest proportion (61.8) percent) of the sweet potato varieties had medium performance while 17.6 percent had high performance and 20.6 percent sweet potato varieties had low performance Therefore, it may be concluded that performance of different sweet potato varieties was moderate at the study area. By showing the characteristics that farmers evaluate, we were able to identify some species that could be used as dual-purpose crops. High yield and dry matter content, along with high soil coverage and grape mass. This not only increases the value of sweet potatoes in promoting food security, but also maintains sustainable sweet potato production. Selection of cultivars that are resistant to SPVD and stable for tuber production in different environments depends on precipitation and temperature, as these two climatic variables have a significant impact on disease development and yield between cultivars. It will be greatly affected. A majority (82.4 percent) of the sweet potato varieties had medium to low performance. All the sample farmers were more or less involved in sweet potato cultivation yet their extent of performance was not satisfactory. Therefore, it may be recommended that necessary steps should be taken to increase the performance of different sweet potato varieties in the study area.

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