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Research Article

Socio-Economic Analysis of Potato in Bajura District of Nepal

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Abstract

Potato (*Solanum tuberosum*) is one of the major staple crop in Nepal. In this context, this research was conducted in 2018 to analyze economics of potato production in Bajura district of Nepal. Dogadi, Kada, Jayabageshwori and Aatichaur wards of Khaptad Chhededaha rural municipality were purposively selected for the study which are also the block of Potato under Prime Minister Agriculture Modernization Project (PMAMP). Primary data were collected using semi-structured questionnaire for household survey, focus group discussions (FGDs) and key informant interview (KII). Household level cross-sectional data from 155 households were collected using simple random sampling technique. The collected data were analyzed using statistical software of MS Excel and SPSS. Descriptive statistics, mean comparison, frequency distribution, trend analysis, chi-square, independent sample t-tests were used to analyze the data. It was found that majority of respondents were male (85.8%). Agriculture was the major occupation (65.8%) and average household size of family was 5.41. The average economically active population was 2.52 and the dependency ratio was 2.90. The average land holding was 5.93 ropani (3.58 was upland and 2.15 was lowland). The dominant cropping pattern was rice-wheat-maize in the study area. The average potato area per household was 1.58 ropani and average production was 609 kg annually. The productivity of potato was found to be 7.33 MT/ha which were half of the national average productivity due to traditional farming technique, no farm mechanization, lack of technical knowledge and lack of improved seed. Post-harvest losses were also quite higher in study area (60 kg per household per year). The benefit-cost r (B/C) ratio for potato production was 1.19 per household.

Introduction

Potato (*Solanum tuberosum*) is a staple crop in Nepal. Potato is considered as one of most important crops in Nepal. According to the recent statistics, potato ranks fifth in area (185,342 ha), second in production (2517696 MT) and fiNRs.t in productivity (14.03 MT/ha) among the major food crops grown in Nepal. It is one of the important cash crops to address food insecurity and reduce poverty among smallholder farmers. in the developing countries like Nepal. Potato can be cultivated in different regions according to altitude [1]. In Terai, potato is grown in winter after paddy, in middle mountain (800-1500masl) potato is cropped after paddy on irrigated terrace and above 2500 m potato is cultivated in mono cropping systems with maize and potato Potato plays significant role in increasing food security and income of the farmers of Nepal. There is different pocket, block, zone and super-zone of

potato present all over the country where Bajura, Chededaha rural municipality (Kada, Dogadi, Aatichaur, Jayabageshowri village) is the block of potato. The total area of potato cultivation in Bajura is 755 ha where the production is 8305mt/t. There are two seasonal potatoes where one is winter season and another is summer season potato. The area of winter potato is 215 ha and production is 2365 mt/t and the summer potato area is 540 ha and production is 5940 metric tons. Potato is used as a subsidiary food as part of vegetable in Terai, where in hill it is used as a staple crop. Unavailability of quality seeds, lack of fertilizers. at right time, shortage of labor, poor market, lack of proper storage house, lack of technical knowledge on pest management and topographical barriers. are the major problems observed in potato cultivation? Due to lack of proper storage and marketing facilities farmers do not get fair price, sometime they even cannot afford to recover the cost of production. The average land holding area of a farmer is 0.3ha. In Bajura, every year 3 months of food scarcity persists due to poor transportation facilities and low average annual income of a

farmer. Majority of people are farmer and agriculture is their main occupation. Farmers used well decomposed FYM to control red ant and Dithane M45 for late blight respectively [2].

Bajura district have low productivity than national average so this study might help to reduce the productivity gap of potato. In absence of sufficient information about pricing mechanism and market potentiality, the farmer of this district are devoid of remunerative profit of their product. Specific research on production and marketing of potato have not been yet conducted in this area. Therefore, the finding of this research will boost up the commercialization of potato in the particular area. It is necessary to find different marketing constraint along with production problem to boost up potato cultivation. PMAMP Block program has been implemented for commercialization of potato and this study may be helpful for the development of potato block. Hence, this research was carried out to analyze the economics of production and marketing of potato.

This study was conducted with following objectives:

- To assess socio-economic characteristics of potato growers
- To assess cost-benefit analysis of potato at farm level and evaluate profitability in production and marketing.

Materials and Methods

The site of the research was Bajura district that lies in Sudurpaschim Provience. The selected wards of the Khaptad Chhededaha rural municipality of Bajura district are Dogadi, Kada, Jayabageshwori and Aatichaur. The reasons for selecting these wards were the favorable climatic conditions which provide comparative advantage of the crop, large scale potato cultivation in this area and also being listed under PMAMP potato block.

Sampling technique: 155 potato farmers 31 farmers from each 5 wards were selected by simple random sampling. The information about the status of post-harvest loss, their income status and the cost benefit of the potato farming were taken.

Sources of data: Both primary and secondary data were sampled for the study purpose. Primary data were collected from face to face interview with farmers and stakeholders through FGD, and KII while secondary data were obtained through reviewing different publications of Agribusiness Promotion and Market Development Directorate, Department of Agriculture, Ministry of Agriculture Development (MOAD), Central Bureau of Statistics (CBS), Agro-enterprise center (AEC), Nepal Agriculture Research Council (NARC) and District Agriculture Development Office (DADO) of respective district.

Data analysis techniques: The collected data was analyzed through SPSS (Statistical Package for Social Sciences). Chi square test, t-test were implemented for the test of hypothesis and MS Excel was used for the problem ranking.

Result and Discussion

Socio-demographic characteristics: Categorical variables of socio demographic characteristics by land category is presented in **Table 1**. The total sample size of household survey area was 155 out of which 85.8 percent were male and 14.2 percent were female. The overall male populations of gender respondent were 133 which were followed by female population of 22. The literate respondents were 46 and illiterate respondents were 54 which were found significant at 1% level of significance in between large scale farmer and small scale farmer in case of gender and literacy of respondent. The literacy rates of household head were found 34.5% were literate and 64.5 % were illiterate. Almost all household head was male.

Majority of population were Brahmin and Chhetri which was found significant at 10% level of significance and all were Hindus. Most of the families were joint family (58.1%) and nuclear families were (41.9%). According, to the result major occupation 65.2% of the surveyed household indicates that they were engaged in agriculture which found significant at 1% level of significance.

Variables	Large scale grower[1] (n=50)	Small scale grower[2] (n=105)	Overall (n=155)	Chi-square value
Gender respondent				
Male	37 (74.0)	93 (91.4)	133 (85.8)	8.448***
Female	13 (26.0)	9 (8.6)	22 (14.2)	(p=0.004 at 1df)
Gender of household head				
Male	50 (100)	105 (100)	155 (100)	
Year of schooling of respondent				
Illiterate	25 (50.0)	29 (27.6)	54 (34.8)	7.474***
Literate	25 (50.0)	76 (72.4)	101 (65.2)	(=0.006 at 1df)
Ethnicity of household				
Brahmin/Chhetri	49 (48.0)	99 (94.3)	148 (95.5)	5.006*
Dalit	0 (0)	6 (5.7)	6 (3.8)	(p=0.082 at 2df)

Religion of household				
Hindu	50 (1000	105(100)	155 (100)	
Type of family				
Joint	31 (62.0)	59 (56.2)	90 (58.1)	0.469
Nuclear	19 (38.0)	46 (43.8)	65 (41.9)	(p=0.493 at 1df)
Education status of household head				
Illiterate	38 (76.0)	62 (59.0)	100 (64.5)	4.252[*]
Literate	12 (24.0)	43 (41.0)	55 (35.5)	(p=0.039 at 1df)
Occupation of household head				
Agriculture	42 (84.0)	60 (57.1)	102 (65.8)	14.509[***]
Wage	1 (2.0)	27 (25.7)	28 (18.1)	(p=0.002 at 3df)
Business	1 (2.0)	2 (1.9)	3 (1.9)	
Services	6 (12.0)	16 (15.2)	22 (14.2)	
Occupation of household head				
Agriculture	42 (84.0)	60 (57.1)	102 (65.8)	10.858[***]
Non agriculture	8 (16.0)	45 (42.9)	53 (34.2)	(p= 0.001 at 1df)
[1] large scale farmer				
[2] small scale farmer				

Table 1: Categorical variables of socio demographic characteristics by land category.

Notes: Figures in parentheses resemble percentage ***, ** and * indicate levels of significance at 1%, 5% and 10%, respectively.

Table 2 presents the continuous variable of socio-demographic characteristics. The average household size of the family was 5.41 in overall and the male members were 2.69 and female members were 2.71. The average age of the large scale farmers was 44.26 and small scale farmers were 37.84 and overall the average age of the farmers were 39.91 where the mean difference was 6.41 which were found significant at 1% level of significance. An average male and female were 2.69 and 2.71 respectively.

Sample population was categorized in age group of 5-15, 15-59 and above 60 in which the age group from 5-15 and above 60 were the dependent group and from 15-59 were economically active member in which economically active member were 2.52 and the dependent were 2.90 respectively. Livestock Standard Unit (LSU) 1 was calculated to study the livestock holding of the household by a common unit. All, the livestock were converted into a single input following the formula:

LSU = 1.5 (number of buffalo) + 1 (number of cow/bull) + 0.6 (number of swine/pig) + 0.4 (number of sheep and goat) + 0.2 (number of poultry).

The obtained LSU was overall 7.44 respectively in the study area.

Variables	Large scale grower (n=50)	Small scale grower (n=105)	Overall (n=155)	Mean Difference	t - value
Family size	5.88	5.19	5.41	0.689	2.199
Age of Respondent (years.)	44.26	37.84	39.91	6.41***	2.821
Male member in house hold	2.88	2.6	2.69	0.27	1.312
Female member in household	3	2.58	2.71	0.419	1.844
Economically active member (age group 15-59 year)	2.72	2.43	2.52	0.281	1.505
Dependency ratio	3.22	2.75	2.9	0.467	1.924
livestock holding (LSU)	6.9	7.7	7.44	-0.803	-0.845
Note: ***indicates 1% level of significant.					

Table 2: Continuous variable of socio-demographic characteristics.

Land holding: Production is the door to economic development but it is marketing, which opens the lock. Thus, marketing plays an important role in agricultural production [3]. The average land holding of farmers were 5.93 ropani where the total land of large scale farmers was 6.52 ropani and small scale growers were 5.66 ropani, respectively. Average low land owned by farmer was 2.35 ropani respectively and average upland owned by farmer was 3.58 ropani which was found significant at 5% level of significance. Average cultivated low land was 2.15 ropani and upland was 3.29 ropani where the mean difference of the upland was found significant at 5% level of significance. Only half of the total lands have the irrigation facilities the reliability of irrigation was not sure in off-season. The average irrigated land was 2.89 ropani respectively.

Variables	Large scale grower (n=50)	Small scale grower (n=105)	Overall (n=155)	Mean Difference	t - value
Total land (ropani)	6.52	5.66	5.93	0.858	1.43
Total irrigated land (ropani)	3.1	2.77	2.89	0.323	0.853
Total area of lowland/khet[1] land (ropani)	2.15	2.45	2.35	-0.302	-0.811
Total area of upland/ Bari[2] land (ropani)	4.37	3.2	3.58	1.160**	2.388
Area of cultivated khet (ropani)	1.93	2.26	2.15	-0.331	-1.106
Area of cultivated Bari (ropani)	3.98	2.96	3.29	1.012**	2.151
Area of irrigated khet land (ropani)	1.25	1.5	1.42	-0.254	-0.969
Area of irrigated Bari land (ropani)	1.85	1.27	1.45	0.578**	2.072
[1] low land					
[2]up land					

Table 3: Land holding of respondents by potato growing land category.

Potato area, production and productivity: The average land holding of farmer were 3.82 ropani for large scales farmer and 1.23 ropani for small scale farmers which shows their mean difference significant at 1% level of significance. The average production of the large scale farmer was 1004 kg and small scale farmer was 421 kg and the overall mean was 609 and the average productivity of large scale farmers and small scale farmers was 7.73(MT/ha) and 7.14(ton/ha) however the data was significant at 1% level of significant. The overall average productivity of potato was 7.33 (ton/ha) which was 14.04 less than the national average overall the low productivity was due to infestation of disease, insect and poor management practice.

Variables	Large scale grower (n=50)	Small scale grower (n=105)	Overall (n=155)	Mean Difference	t - value
Area of potato (ropani)	3.82	1.23	1.588	1.366***	9.593
Production of potato (kg)	1004	421	609	583.87***	7.794
Productivity of potato (ton\ha)	7.73	7.14	7.33	0.586***	3.004

Table 4: Potato cultivated area, production and productivity of different grower category.

Area of potato of different season and production: Potato cultivation was found to be more in rainy season and comparatively less in winter season. The average area and production of potato of rainy season between large scale farmer and small scale farmeNRs. were 2.18 ropani and 0.95 ropani and the production was 714 kg and 358 kg which were found significant at 1% level of significance. And the average area and production of winter season potato between farmers were 0.95 ropani for large scale farmer and 0.28 ropani for small scale farmer which was found significant at 1% level of significance. The production of winter potato was 167 which is lower than the rainy potato production and the cause of low production was only few people cultivate potato during winter season due to low productivity than rainy season

Different seasonal potato area and production	Large scale grower (n=50)	Small scale grower (n=105)	Overall (n=155)	Mean difference	t-value
Rainy area (ropani)	2.18	0.95	1.57	1.91***	8.269
Rainy production (kg)	714.5	358.09	473.06	356.40***	3.9266
Winter area (ropani)	0.95	0.28	0.49	0.674***	3.993
Winter production (kg)	276.7	116.19	167.967	160.5	1.445

Table 5: Area of potato of different season and production.

In an average 146 Kg tuber potato was found to be consumed by a household which is equivalent to NRs. 2934. Consumption of potato per capita was 31 kg of Bajura, District Chhededaha Rural municipality where the annual consumption potato was 29.4 kg per person [4].

Variables	Large scale grower (n=50)	Small scale grower (n=105)	Overall (n=155)	Mean difference	t-value
Quantity home consumption(kg)	162.9	136	146.7	26.9	1.575
Per capita consumed	33.4	30.5	31	3.35	0.646
Value of home consumption (NRs.)	3383.99	2720	2934.19	663.99	1.575

Table 6: Quantity of home consumption and its value.

The average postharvest losses were 60kg and which is equivalent to NRs. 1206 per household.

Postharvest loss and amount of harvest loss	Large scale grower (n=50)	Small scale grower (n=105)	Overall (n=155)	Mean difference	t-value
Postharvest loss (kg)	67	57.152	60.329	9.847	1.226
Amount Postharvest loss (NRs.)	1340	1143.0.	1206.58	196.95	1.226

Table 7: Postharvest loss and amount of harvest loss.

The average cost of potato cultivation across the rural municipality was NRs. 1190per household. Out of which, average cost of potato seed shared NRs. 7683, average cost of labor shared NRs. 11400 which were found significant at 1 % level of significance. Average cost for harvesting was NRs. 1269. Among all this cost average cost of labor for cultivation was higher than other cost beacause most of the operational activities for producing was done manually like preparation, seeding, manuring and fertilizing, harvesting and grading.There was no use of pesticide and insectiside, herbicide and relatively low amount of chemical fertilizer were used for potato culitvation due to lack of marketing facilities of these product and information about these things.

The production was found to 609 kg, gross return was NRs.15234 and gross profit was NRs. 3345 per household. Whereas the large scale grower have more production, gross return and gross profit than small scale farmer. And the B/C ratio was found to be 1.19 per household respectively.

Cost and Return per HH	Large scale grower (n=50)	Small scale grower (n=105)	Overall (n=155)	Mean difference	t-value
Cost/HH (NNRs..) for:					
Potato seed	12446.77	56890	7863	6766***	7.425
Labor for cultivation	2430.38	1101.29	11400	1329***	7.556
FYM	891.12	768.06	807	123	1.067
Chemical fertilizers	514.74	403.49	439	111	0.876
Harvesting	2008	918.1	1269	1089***	7.388

Total cost	18291.01	8871.6	11910	9419***	7.498
Production and return/HH:					
Production (kg)	1004	421	609	583***	7.794
Gross Return/HH (NNRs.)	25123	10526	15234	14596***	7.794
Gross Profit (NNRs.)/ HH	6873	1665	3345	5207***	6.998
B/C ratio/HH	1.3	1.14	1.19	0.162***	3.484

Table 8: Economic analysis of different potato grower category.

Cost and Return per ropani	Large scale grower (n=50)	Small scale grower (n=105)	Overall (n=155)	Mean difference	t-value
Cost (NNRs.) for:					
Potato seed	4950	4950	4950		
Labor for cultivation	966	962	964	3.44	0.272
FYM	579	853	765	-274	-2.04
Chemical fertilizers	380	469	441	-89.36	-0.585
Harvesting	783	800	764	-16.61	-1.51
Total cost	7643	8023	7901	-380	-1.78
Production and return/ropani:					
Production (kg)	386	357	366	29.30***	3.004
Gross Return/ropani (NNRs.)	9666	8933	9170	732***	0.118
Gross Profit (NNRs.)/ ropani	2022	910	1268	1112***	3.012
B/C ratio/ropani	1.3	1.13	1.19	0.161***	3.484

Table 9: Cost, production and return of potato production per ropani.

Problem of potato cultivation: Scaling techniques is very useful to quantify the qualitative information. Scaling techniques identify the strength of agreement and disagreement on particular statement. The scale value depends on the degree of agreement of assignment by summing up the scale, value total value can be obtained. The total value indicated the position of statement in the continuum. Based on the direct field observation and informal talks with DADO officers, major problems associated with potato production in the district were identified and included in the interview schedule. The major five problems were lack of infrastructure, poor marketing infrastructure, insect and pest damage, unavailability of inputs and postharvest loss. The farmers were asked to rank these problems. The result showed that Infrastructure and poor marketing infrastructure was the major problem of potato production. Insect-pest and unavailability of inputs were third important problem followed by postharvest loss

Factor's	Index	Rank
Infrastructure	0.895484	I
Poor marketing infrastructure	0.816774	II
Insect pest damage	0.703226	III
Unavailability of inputs	0.508387	V
Postharvest loss	0.514839	IV

Table 10: Ranking present problem of potato cultivation.

Farmers performs general grading operations and bring their produce in bamboo baskets (*Dokos)* to the nearby markets (Pokhrel, 2010). Farmer sells most of the produce (69%) to local collector or trader. Only (3.2%) of the produce was directly sold to consumer. About 17.4 % of potato was in loss due to no sale at all. Topographical barrier was the main problem for transportation of potato and low price on the market was also the major problem also for no sale. Only 6.5% were sold direct to whole-seller and rests of 3.9% were to the cooperative. Due to presence of large number of middle man farmers didn't get the actual price of potato production.

Market channel of potato	Large scale grower (n=50)	Small scale grower (n=105)	overall (n=155)	chi-square value
No sale at all	13 (26.0)	14 (13.3)	27 (17.4)	10.287
Consumer	3 (6.0)	2 (1.9)	5 (3.2)	(p=0.36 at 4 df)
Local trader	26 (52.0)	81 (77.1)	107 (69.0)	-
Whole seller	5 (10.0)	5 (4.8)	10 (6.5)	-
Cooperative	3 (2.9)	3 (6.0)	6 (3.9)	-

Table 11: Marketing channel of different potato grower category.

Conclusion

Higher percentage of economically active population and major occupation being agriculture indicate that agricultural commercialization through agriculture based technology is the major way of uplifting economic condition of the people in the research site. Due to low benefit cost ratio and low gross margin potato cultivation is not a profitable enterprise in Bajura district of Nepal. The factor affects the commercialization of potato such as land holding, commercial training, economically active population, marketing cost and collection center are highly significant. It indicates that the appropriate change in these factors give significant contribution in the commercialization. The low production and productivity was due to infestation of disease on standing crop [5-8]. Technical and managerial skills on cultivation practices and provision of technical knowledge to control diseases as well as proper allocation of inputs and available resources would help to increase profitability and productivity of potato. It is suggested to use disease-resistant improved varieties and follow appropriate recommended cultural practices.

References

1. Acharya SS and Agrawal NL (1999) Agricultural marketing in India (3rd ed.) Oxford and IBH Publishing Co.Pvt.Ltd.

2. AICC. (2073/2074). krishi Diary. Kathmandu: Ministry of Agricultural Development.

3. DADO. (2016). District Agriculture Profile Book. Nepal: District Agriculture Development Office.

4. Ghose, B. (1981). Scientific methods and social research. New Delhi, India: Sterling publication.

5. GoN. (2015/2016). ANNUAL HOUSEHOLD SURVEY. Kathmandu: GOVERNMENT OF NEPAL.

6. MOAD. (2016/17). Statistical Information on Nepalese Agriculture. Kathmandu: Ministry of Agricultural Development.

7. Pokhrel DM (2010) Comparison of farm Production and Marketing Cost and Benefit Among Selected Vegetables Pockets in Nepal. The Journal of Agriculture and Environment 11: 10-25.

8. Timilsina, KP, Kafle, K and Sapkota S (2013) Economics of potato (*Solanum tuberosum L*) production in Taplejung district of Nepal. Agronomy Journal of Nepal 2: 173-181.

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