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USE OF MOBILE PHONES BY FARMING COMMUNITY AND ITS IMPACT ON VEGETABLE PRODUCTIVITY

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ABSTRACT:- In Pakistan, telecommunication tools like television, radio and mobile phone are playing important role in agriculture productivity enhancement, growth and farmers' prosperity. Mobile phone helps farmers in getting information about commodity prices in different markets. The farmers can get up-to-date information about various markets in different regions and can accordingly arrange transportation and labor services in time. The study was conducted to see the effect of timely information availability with mobile on productivity. The data was collected through well structured questionnaire by interviewing 60 farmers from district Charsadda. The data was analyzed through simple averages, correlation analysis and paired t-test. Average yield of bitter gourd crop was 23569 kg acre^{-1} with cell phone use of 8h per season. It is perceived that low communication cost and availability of information about wholesale market prices through SMS service and low cost calling packages will help farmers and market agents in improving bitter gourd production and its marketing, respectively.

Key Words: Bitter Gourd; Mobile Phone; Productivity; Correlation Analysis; Pakistan.

INTRODUCTION

Agriculture needs to cater for the needs of diverse customer in terms of food and raw materials. Technological intervention in the form of machines, equipments and procedures is helping in the preservation and environmental protection. Being practiced in open environment, surrounding conditions affect agriculture production in various ways (Munack and Speckmann, 2001). Despite high claims of government, investment in agriculture and rural development is still low. Farmers are subject to less than perfect information, volatile markets to manipulation and uninformed decisions. Farmer's participation in market and transport management is so poor that most of the time they are being forced to sell their products to local middlemen at dumped prices (FAO, 2001). Telecommunication and specifically mobile phones have the potential to provide solution to the existing information asymmetry in the sectors like agriculture (Mittal et al., 2009). Radio and television has been acclaimed to be the most effective media for diffusing the scientific knowledge to

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the masses while, television is acknowledged as the most important medium for communicating with the rural populations of developing countries (FAO, 2001). Most often, few agricultural programmes are not timed to suit the farmers. Consequently, most farmers are constrained to rely on third parties for agricultural information, which may often be biased (Nazari and Hassan, 2011). Improving information services through telecommunication technology has a proven positive impact on rural incomes. In Peru, 13% increase in per capita farm income was observed due to mobile phone technology (Chong et al., 2005). Access to public telephones and especially individual mobile phones improves agricultural productivity, increases market access and expands marketing options for rural producers (Jansen et al., 2006). Mobile phone technology has provided opportunities for increasing productivity and reducing socio-economic inequalities in Bangladesh (Islam and Gronlund, 2011). Literature reveals that mobile phone has been used for warning against bad weather to the fishing communities. It is necessary to evaluate its role in the farmers decisions about market participation.

In Pakistan, vegetables are mostly sold in auction type markets which are located at some distance from one another. Cell phone use can help in reducing farmers and marketing agents in getting the price information from different markets to avoid the transportation cost involved from one market to other and enable them to sell their vegetables in time. An important assumption of marketing is existence of transparent /perfect information about the market situation to all i.e., producers, market agents and consumers as well. The long distance from farm to market is hampering the gathering of information about prices but mobile phone can efficiently fulfill this gap as it provides timely information about the market situation. In vegetables, bitter gourd has an important place and mostly grown for commercial purpose in Khyber Pakhtunkhwa. Requirement of inputs is high and diverse than other crops which intensify the need for mobile phone. Arranging for the inputs in time and selling in high priced markets has a positive impact on vegetable productivity. This study has a focus on the linkages between use of mobile phone and bitter gourd productivity in Khyber Pakhtunkhwa.

MATERIALS AND METHOD

The study was based on primary data, collected through proportionate random sampling technique using structured questionnaire in Charsadda district. The District comprises three tehsils namely, Charsadda khas, Tangi and Shabqadar. Two tehsils (Charsadda khas and Tangi) were selected on the basis of area under bitter gourd. Four villages (Shakh No. 6, Harichand, Mandani, Thor Dher) from Tangi whereas, Sarki, Zarbab Garhi, Behlola and Gardhai were selected from tehsil Charsadda khas on the basis of their shares in production. Sample of 60 farmers was selected from farmers of bitter gourd on the basis of 95% confidence level and 10% confidence interval (Shahzad et al., 2013). Data was analyzed by using STATA-12.

Correlation analysis as per following was used to determine the

relationship between cell phone used hours and bitter gourd productivity which quantifies the extent to which two quantitative variables, X (cell phone used hours) and Y (productivity of bitter gourd kg acre^{-1}) are correlated (Gujarati, 2004).

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{\{n\sum x^2 - (\sum x)^2\}\{n\sum y^2 - (\sum y)^2\}}}$$

As most of the farmers used other inputs in the same proportion so they were divided into two groups i.e., max (maximum cell phone hours consumed) and min (minimum cell phone hours consumed) on the basis of cell phone time (hours). Difference of productivity was analyzed through paired t-test. Treating the difference as random sample from a normal population with mean $_D$ max min and unknown standard deviation D one sample t-test was performed on them.

The testing hypothesis procedure for paired t-test is given as under;

Testing hypothesis H_o : μmax = μmin (No difference in the productivity of both groups)

And the alternative is H_1: μmax > μmin (Productivity of max group are more than min group)

Test statistics

$$t = \frac{\bar{d}}{s_d / \sqrt{n}}$$

with v = n – 1 degrees of freedom at 0.05 significant level.

RESULTS AND DISCUSSION

Characteristics and Practices of Farmers

Descriptive analysis of farmers revealed that their mean age was 32 years with a standard deviation of 11 years indicating the involvement of relatively young segment of population in the bitter gourd production. Level of the farmers' education and experience was 7.6 and 5.1 years on the average with farm size of 1 acre. Other studies revealed more age, experience and relatively low level of education for the vegetable growers in other parts of the province (Tahir and Altaf, 2013). Farmers applied 14 bags per acre of different fertilizers on the average with standard deviation of 7.8 showing that some farmers had applied fertilizers less than the required. Farmers consumed 7h air time in raising 23569 kg acre^{-1} of bitter gourd production by employing 191 labor man days and 43 irrigations on the average. It was observed that bitter gourd is much more profitable than other competing crops (Table 1).

Table 1. Farmers characteristics

Characteristics	Mean	±	SD
Age (years)	32.0	±	11.0
Experience (years)	5.1	±	3.7
Education (years)	7.6	±	4.7
Bitter gourd area (acre^{-1})	1.0	±	0.7
Fertilizer (bags acre^{-1})	14.0	±	7.8
No. of cell phone (h)	7.0	±	3.8
Self visit time (h)	17.0	±	8.4
Irrigation (No.)	43.0	±	9.6
Insecticide expend. (Rs.)	1126.0	±	766.4
Labor (man days)	191.0	±	93.0
Productivity (kg acre^{-1})	23569.0	±	20160.8

Source: Field Survey, 2012

Inputs Use and Average Yield

Access to inputs have positive effect on crop productivity (Randrianarisoa and Minten, 2005). It was found that farmers used intensively mobile phone for the arrangement of different inputs. Farmers were divided into three categories on the basis of farm size i.e., small (≤1.5 acres), medium (1.51 - 2.95 acres) and large (> 2.96 acres) (Husain et al., 2001). Results revealed that small farmers had more intensive use of inputs than medium and large farmers on per acre basis and same is reported by Chen et al. (2011). Yield level (35469 kg) of small farmers was quiet higher than the other two groups. Overall yield was 23569 kg by the application of 8 cell phone hours, 14 self visit hours and fertilizers bags with 43 irrigations on the average. Mobile phone enabled the farmers to devote more time to their crops by saving their travel time to get market information. More use of mobile phone enabled small farmers to receive higher price of Rs. 11.5 kg^{-1} for their produce by using 12h air time. On the other hand large farmers received average price of Rs. 9.4 kg^{-1} with 4h air time (Table 2). It is clear that mobile phone has increased the bargaining power of the farmers which helped them in setting a base price for their produce. Selling at higher prices enable farmers to earn more income and in turn they applied sufficient inputs for better yield (Muto and Yamano, 2008).

Correlation Analysis of Mobile Phone used (hours) and Productivity

Results revealed moderate and positive correlation of 0.6848 between mobile phone use (h) and bitter gourd productivity (kg $acre^{-1}$). There is no big vegetable market in Charsadda and farmers rely on mobile phone to take price information from different markets across the province. Farmers in Charsadda had contacts with many diverse markets which enabled them to fetch higher prices for their produce, helping to obtain higher yields. In addition to mobile phone there were many other necessary inputs having role in the productivity of the crop. It was observed that mobile phone is used for arranging various inputs like wooden poles, steel wire, thread, used cycle tyres, seed, fertilizers, water, transport and taking price information from various markets. It was also revealed that

Table 2. Inputs used by farm size

Farm size	Freq. (%)		Cell phone (h)	Self visit (h)	Fer. (50 kg bags)	No. of Irr.	Total cost (Rs.)	Price ($Rs.kg^{-1}$)	Yield (kg)
Small	16	(26)	12	18.1	21.5	44	111403	11.5	35469
Medium	18	(30)	8	12.2	15.4	45	77984	10.9	23502
Large	26	(44)	4	12.0	7.9	42	59361	9.4	16293
Total	60	(100)	8	14.0	14.0	43	78826	10.6	23569

Source: Field survey, 2012.

mobile phone facilitate the farmers for arranging combined transport which reduced transportation cost. Mobile phone enabled the farmers to communicate with agricultural expert in time of disease attack on the crop. These factors resulted in the high correlation between cell phone used (h) and crop productivity (kg $acre^{-1}$).

Significance of the Relationship Between Mobile Phone Used (Hours) and the Crop Productivity

Five hours consumed time was set as threshold level for the classification of farmers into two groups. Farmers using more than five hours were placed in max group while the others were placed min group. Paired t-test revealed that max group had higher yield than the min group. Our null hypothesis of no difference between the two groups was rejected. Computed value of t-statistic at 95% significant level confirmed the higher yield for the max group and acceptance of alternate hypothesis (Table 3).

Table 3. Comparative analysis of mobile phone and bitter gourd productivity

Variables	Mean± S.E.	Standard deviation
Max	32713.54 ± 4477.198	24522.62
Min	14424.71 ± 1323.788	7250.68
Diff	18288.82 ± 4639.863	25413.58

t = 3.9417 Observations = 30; dF = 29, Pr (T > t) = 0.0002

CONCLUSION AND RECOMMENDATIONS

Mobile phone proved to be a cheaper source of getting information, increased farmers' market participation. Mobile phone use helped farmers in setting base price and choice of market. Mobile phone use has a positive impact on bitter gourd productivity. Farm size has a negative effect on the productivity due to input intensive nature of bitter gourd farming. Following are few recommendations based on the findings.

- Availability of timely information about wholesale level market prices helps farmers in choice of markets to fetch better prices of their produce;
- Mobile phone companies should provide vegetable market price information to the farmers through SMS service;
- Mobile phone companies should give low price call packages to farmers;
- Mobile phone coverage should be extended to the far flung rural areas;
- Availability of quality fertilizers and insecticides at reasonable prices should be ensured;
- Easy credit availability should be ensured to the farmers;
- Farmers should be provided soil testing services at affordable prices to determine the requirements of various nutrients for the crop;
- Extension workers should guide farmers regarding the application of various fertilizers in sufficient quantities;
- Road infrastructure in the rural areas be improved for quick transportation.

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