Research Article

An Effectiveness of Extension Trainings on Boosting Agriculture in Federally Administered Tribal Areas (FATA) of Pakistan: An Evidence from Bajaur Agency

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Abstract | Agricultural Extension trainings play a crucial role in agricultural development of the rural community. The current study was intended to investigate the effect and role of extension trainings in the improvement of main agricultural crops and vegetables in Bajaur Agency of Federally Administered Tribal Areas (FATA) during the year 2016-17. The study was based on primary data collected from 166 sample respondents who got training from Bajaur Area Development Program (BADP) using a well-structured interview schedule; through personal interview method. Result showed that 63.9% of the respondents were illiterate, 31.3% respondents were in age group between 25-35 years. Yield, income, plant spacing, seed rate, irrigation interval, and use of pesticide before and after training were computed with the help of paired sample t-test. Results revealed that in maize there is a significant decrease for seed rate (-11.6743 kg/acre) and irrigation interval (-16.03 days) after training, while significant increase in mean difference was recorded for row-to-row distance (38.7 cm), plant-to-plant distance (8.22 cm), use of pesticide (0.2108), yield (237.46 kg/acre) and income (Rs 50783.08) after training. Mean value obtained for wheat yield was 325 kg/acre after extension trainings. Similarly, a significant increase for tomato (449 kg/acre), onion (298 kg/acre) and okra (232 kg/acre) yield was found after the delivery of improved farming practices through extension trainings. Tomato income was increased with a significant mean difference of Rs.104457 after extension recommendations. It is concluded that extension department performed well in the empowerment of farmers and increasing crop yield in the study area. The study recommends need based trainings for growers, availability of credit/loan facilities, provision of subsidized inputs and irrigation water in the study area.

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Keywords | Extension trainings, Improved farming practices, Yield, Income

Introduction

In Pakistan about 70% of the total population is living in rural areas which largely depends upon agriculture directly or indirectly for their livelihood (Dev, 2011; Hanif et al., 2010). Economy of Pakistan depends on the development of agriculture (Ali et al., 2013), dependency on agriculture for rural livelihood is very common due to its major role in poverty reduction (Ogunlela and Mukhtar, 2009). Agriculture contributes 19.8% share to the economy of Pakistan and almost 42.3% of labor force is engaged with this profession (GoP, 2017). In this modern age of science and technology; agriculture has become too complex to be managed successfully by illiterate and unskilled farmers (Chaudhary, 2006). In this scenario, nothing

seems more crucial than an effective agricultural extension services, which through its concerted educational functions; can improve the managerial capacities and analytical skills of farmers to make intelligent decision regarding their day-to-day farm affairs (Benet et al., 2001; Agwu et al., 2008). Farmers' level of productivity can significantly increase through the application of modern technologies and providing them with physical resources necessary for implementation (Rosegrant and Cline, 2003; Adenji and Ega, 2006). In this context, agricultural extension has the responsibility of transferring need based scientific information from researchers to farmers, helping them to identify their needs and goals, seek possibilities, and educating farmers to take timely and better decisions regarding their farms (Ben and Hawkins, 1996). Agricultural extension seek to influence the behavior of farmers (Inayat, 2007). Their objective in doing so vary widely, from the adoption of new enterprises or technology, to use more environmentally sustainable practices for the enhancement of farm management and problem solving skills of farmers (Khan and Akram, 2012; Aziz et al., 2018). Trainings are an important tool for transferring of updated technological knowledge to farmers. Trainings has a significant effect on the acquisition of knowledge, skill, and competencies of trainees (Al-Sharafat, 2012).

Bajaur Agency (FATA) is a remote and one of the most backward areas of the country. Agriculture is the main source of livelihood of majority of the people; both Kharif and Rabi crops are grown; but due to low land holding, fragmentation and non-adoption of improved technologies; farmers are getting low per acre yield in the study area. It is the dire need to disseminate improved technologies through need based trainings among the farmers to improve per acre yield. Bajaur Area Development Program (BADP) has conducted different trainings regarding various crops and vegetables. Therefore, the present study "an effectiveness of extension trainings on boosting agriculture in Federally Administered Tribal Areas (FATA) of Pakistan: an evidence from Bajaur Agency" was initiated. The present study has following objectives:

1. To study the existing situation regarding farming practices in Bajaur Agency.
2. To investigate the effectiveness of extension trainings in improving main agricultural crops and vegetables in study area.

Materials and Methods

The study was conducted in Bajaur Agency of the Federally Administered Tribal Areas (FATA) of Pakistan. It has seven tehsils (as shown in Figure 1); tehsil Muhmund was selected purposively, because under Bajaur Area Development Program (BADP) extension department has conducted different trainings regarding various crops and vegetables in the selected tehsil.

Figure 1: *Map of Bajaur Agency.*

A list of all villages from the selected tehsil was prepared and three villages (Zaga Deri, Maukha, and Gaberay) were randomly selected for data collection. It is important to note that a total of 166 respondents who got training from extension department were selected for this research study i.e. from village Zaga Deri 80 respondents, from Maukha 50, and from village Gaberay 36. A well-planned interview schedule was designed and pre-tested for the collection of primary data. The collected data were analyzed on the basis of percentages, frequencies and graphs. Data interpretations were computed by descriptive and inferential statistics. Paired sample t-test was applied to find out mean difference in yield and income of maize, wheat, tomato, onion and okra before and after training.

Results and Discussion

Age

Age is positively associated with adoption or rejection of agricultural innovations (Agwu et al., 2008; Jensen et al., 2009). Table 1 represent age of the respondents in the study area, 15.7% of the respondents were young i.e. less than 25 years, 31.3% lied in age group of 25-35 years, 23.5% of the respondents were from the age category of 36-45 years, while the remaining 29.5% were above 45 years age. In this research study, majority portion of the respondents were from the

young group i.e. 25-35 years. Our results are in line with Farah et al. (2011) who reported that majority of the respondents were young in the study area.

Table 1: *Distribution of the respondents according to their age and education.*

Characteristic	Category	Frequency	Percentage
Age	< 25 years	26	16
	25-35	52	31
	36-45	39	23
	46 and above	49	30
	Total	166	100
Education	Illiterate	106	64
	Literate	60	36
	Total	166	100

Source: *Field survey, 2017.*

Education

Adoption of innovation is directly correlated to education (Saadi et al., 2008). Litrate farmer is more alert about agricultural innovations and towards modern farming practices (Aziz et al., 2018). Anandajayasekeram (2008) concluded that the acceptance of extension advice and guidance of rural community is greatly affected by literacy status. The literacy status of the respondents is also given in Table 1 where 64% respondents were illiterate, while 36% of the respondents were literate. Illiteracy has a prominent effect on adoption level and skills acquisition among farmers (Oyekale and Idjesa, 2009).

Paired sample t-test analysis of various crops before and after extension training

Maize: Maize is one of the major crop grown in Pakistan. Maize production in Pakistan has increased from 1.76 million tons in 2001-02 to 4.94 million tons during 2013-14 due to adoption of improved hybrid varieties (PARC, 2014). Paired sample-t test was applied to find out the mean difference among various parameters for maize crop before and after extension trainings. The results given in Table 2 shows highly significant decrease (-11.674 kg/acre) in seed rate of maize after training. The mean difference was increased for row-to-row and plant-to-plant distance i.e. 38.7 cm and 8.22 cm respectively. Akbar et al. (2010) stated that plant population affect yield and failure to use the recommended spacing could affect the crop yield negatively. The mean difference value (-16.03) was decreased for irrigation interval, while mean difference (0.2108) of pesticide used was increased after getting training. This situation is very alarming and should be addressed. Integrated pest management (IPM) *initiatives should be used* to reduce use of pesticides and its residual effect on environment (Jacobsen, 1996; Kropff et al., 2008; Osei et al., 2014).

Maize yield and income: The results presented in Table 2 show that after getting training maize yield of the respondents was increased i.e. 237.46 kg/acre, while income was increased up to Rs. 50783.08/acre. Our results are supported by experimental findings of Khan et al. (2003) who reported that after adoption of preventive measures against maize weeds; the net profit of Rs 43030/ hectare was obtained in the study area.

Wheat: Paired sample t-test analysis presented in Table 2 show that there was 325 kg/acre increase in wheat yield after extension training. Different improved wheat varieties used by the farmers were; Pakhtunkhwa-2015, Pirsabak-2005, Pirsabak-2013 and Pirsabak-2015.

Tomato: Tomato is a major cash crop. However, majority of the farmers are poor and thus are likely to operate with low level of production inputs. Statistical analysis revealed net income from tomato was increased after the adoption of extension recommendations in the study area. Majority of the respondents used improved tomato varieties like Sahel, Anna, Lema and Larica in order to get higher yield. Paired sample t-test comparison of tomato income before and after extension training is given in Table 4. Before extension recommendations, total average net income from tomato was Rs. 337,108/ acre, while it was increased up-to Rs. 441,566/acre after extension recommendations with net difference of Rs. 104,457/acre.

Yield of tomato, onion and okra: A visible increase in yield of tomato, onion and okra was observed which is clear from Table 5. A significant increase in toato yield (449 kg/acre) and onion yield (298 kg/acre) was observed in the study area. Recommeded seed rate, proper spacing and irrigation was applied to onion orchids which resultantly gave satisfactory results. Swat-1 onion variety was used by all the respondents in the study area. Similarly, mean difference value was recorded for okra yield (232 kg/acre) after extension trainings was which is a good sign of vegetables' promotion in Bajaur Agency.

Table 2: *Paired sample t-test comparison of various parameters of maize crop before and after extension training.*

Variables	Before extension training		After extension training		Mean difference	t-value	P-value
	Mean	SD	Mean	SD			
Seed rate	22.9260	3.86546	11.2517	1.80946	-11.6743 kg/acre	25.152	0.000***
Row to row distance	24.91	5.487	63.61	5.020	38.7 cm	-69.467	0.000***
Plant to plant distance	10.51	2.519	18.73	2.990	8.22 cm	-27.708	0.000***
Irrigation interval	35.90	16.84	19.87	5.61	-16.03 days	11.83	0.000***
Pesticide	0.7892	.40914	1.0000	.00000	0.2108	-132.602	0.000***
Yield	1035.71	123.28	1273.17	197.14	237.46 kg/acre	-19.959	0.000***
Income	43555.36	19101.83	94338.44	34995.97	50783.08 Rs	-16.308	0.000***

Source: *Calculated by Author, 2017; *** indicates significance level at 1% probability.*

Table 3: *Paired sample t-test comparison of wheat yield before and after extension training.*

Variable	Before extension training		After extension training		Mean difference (kg/acre)	t-value	P-value
	Mean (kg/acre)	SD	Mean (kg/acre)	SD			
Wheat yield	846	50.02	1171	45.18	325	-60.42	0.000***

Source: *Calculated by Author, 2017; *** indicates significance level at 1% probability.*

Table 4: *Paired sample t-test comparison of tomato income before and after extension training.*

Variables	Before extension training		After extension training		Mean difference (Rs)	t-value	P-value
	Mean (Rs)	SD	Mean (Rs)	SD			
Tomato income	337108	40016.06	441566	49432.70	104457	-22.86	0.000***

Source: *Calculated by Author, 2017; *** indicates significance level at 1% probability.*

Table 5: *Paired sample t-test comparison of tomato, onion and okra before and after extension training.*

Variables	Before extension training		After extension training		Mean difference (kg/acre)	t-value	P-value
	Mean (kg/acre)	SD	Mean (kg/acre)	SD			
Tomato yield	3900	200.15	4349	478.22	449	-10.63	0.000***
Onion yield	2858	225.94	3156	195.83	298	-13.29	0.000***
Okra yield	2678	199.42	2910	99.71	232	-12.82	0.000***

Source: *Calculated by Author, 2017; *** indicates significance level at 1% probability.*

Conclusions and Recommendations

It is concluded that extension played a vital role in boosting overall agriculture in Bajaur Agency. Farmers adopted improved farming practices after extension recommendations. It is also concluded that yield of maize, wheat, tomato, onion and okra was increased after extension trainings through the adoption of high yielding varieties and improved farming practices. The study recommends need based trainings for growers, availability of credit/loan facilities, provision of subsidized inputs and irrigation water in the study area. Efforts should be made to replace the use of chemical pesticides with integrated pest management (IPM) practices in order to minimize environmental and health hazards.

Author's Contribution

Sanaullah: Conducted the research, collected and analysed the data, wrote the first draft of the manuscript.

Urooba Pervaiz: Supervised and guided during whole study and finalized the manuscript.

Novelty Statement

The study is unique to investigate the effect and role of extension trainings in the improvement of main agricultural crops and vegetables in Bajaur Agency of Federally Administered Tribal Areas (FATA). It also recommends need based trainings for farmers and availability of credit/loan facilities, provision of sub-

sidized inputs and irrigation water in the study area.

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