Research Article

Creating Awareness Among Farmers for the Use of Mobile Phone Cellular Technology for Dissemination of Information Regarding Aphid (*Macrosiphum Miscanthi*, Hemiptera, Aphididae) Attack on Wheat Crop

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Abstract | This study was conducted in December. 2014 in district Sargodha-Punjab, Pakistan to assess the role of Mobile phone cellular technology for dissemination of information regarding *Macrosiphum miscanthi*, attack on wheat crop by mobile phone. A sample size of 60 farmers was selected by systematic sampling technique using the available list of the farmers provided by Agricultural Extension Department. The respondents were than randomly assigned into two groups, one group was comprised of experimental group (to whom a set of advisory instructions were sent by mobile phone) and other was control (face-to-face). Two- population independent t-test was applied for comparison of the two methods of instructions. The results of the study revealed that both methods were equally applicable and effective regarding timely transfer of information or knowledge to the farmers for aphid attack on wheat crop. Hence, it is concluded that the goal for creating awareness among farmers for the use of Mobile phone cellular technology is as effective as face-to-face (traditional method) for dissemination of desired information regarding aphid attack on wheat crop. In addition, more respondents may interact with the Extension Field Staff (EFS) by using cellular technology irrespective whether or not EFS are able to reach them physically.

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Introduction

Sustainable agriculture system needs research based agricultural practices which depend on sharing and transfer of agricultural knowledge by advanced Mobile phone cellular technology. Use of appropriate means and tools for transfer of knowledge is the key for sustainable development in agriculture in 21st century.

At present, it is hard to believe that growing demands of food supply would meet in future. It is expected that world population will cross the number of 9 billion by 2043 (U.S. Census Bureau, 2009). Consequently, it is required that attention must be diverted to increase the food production to feed the imminent influx of population. On the other hand, available data showed that farmers are gradually leaving farming and seeking other sources of earning. In one report of Economic and Social Development Department, Food and Agriculture Organization of the United Nations (FAO, 2011) pointed out that the percentage of farmers has gradually decreased from 50.4% of total world labor

force in 1980 to 39.9% in 2010.

Developed countries have already overcome their basic agricultural issues and now they are focusing in research on developing advanced agricultural techniques like precision agriculture, new verities of genetically modified plants, and marketing etc. etc. However, in developing world, the situation is far behind for example researchers are still dealing the issues like insufficient infrastructure, poor literacy and solving basic problems of the growers. In addition, there are certain barriers in transferring of knowledge from developed world towards developing world. To overcome the problem of digital division of the world, latest information and communication technology ought to disseminate among end-users for transfer of timely information for sustainable agricultural development. In this way, the planners may be able to meet the growing needs of food for future generation.

Research and Extension have significant role in adoption and diffusion of any agricultural technology among growers. The need is; extension worker must regularly intervene into farmer's activities and should play a pivotal role in teaching and dissemination of any kind of information and communication technology. Growers can easily get information regarding weather, marketing and other advisory services through learning better use of mobile phone cellular technology. According to Ilahiane (2007) mobile Phones cellular technology have completely changed the way in which farmers exchange information with each other and interact with markets and cities and which enable farmers to extract relevant information for their decision making.

In Pakistan, there are number of mobile phone companies are operating like Warid, Telenorr, Uphone, and Zong. Most of the companies offer 3G and 4G technologies to their customers that allow them to access internet on their mobile phones. Access, efficiency and affordability of agricultural information are major constraints in enhancing agricultural productivity among small scale farmers (Murithii, 2009). Mobile phone cellular technology provides easy and economical access to information for growers. According to Chisita (2010) there is immense potential in harnessing informational communicational technologies (ICT's) for disseminating agricultural information thereby allowing small scale farmers to share knowledge and experience through utilizing social media, tele-centers and other ICT driven communication devices. It is further emphasized that at this time of the information age, one cannot ignore the benefits of information technology since there is hardly any field where digital, information and communication technology has not yet intervene. According to Tantisantisom (2011) learning of new techniques and profitable agricultural production methods in their own language using ICTs may encourage farmers to adapt advanced practices and to improve their agricultural production.

Materials and Methods

This study was conducted in December 2014 in district Sargodha to create awareness among farmers for the use of mobile phone cellular technology for dissemination of information regarding aphid (*Macrosiphum miscanthi)* attack on wheat crop. Randomized subjects, post test-only control group design was applied. It is the simplest type of experimental design used in educational research. This design also leads the simplest use of statistical technique such as comparison of two groups (control and experimental) using student's t-test and the results may only be generalized to the population under study.

According to Donald et al. (1996) this design requires two randomly assigned groups of subjects each assigned to a different condition. No pretest was used. A sample size of 60 farmers was selected by systematic sampling technique using the available list of farmers provided by Agricultural Extension Department. The respondents were than randomly assigned into two groups, one group was experimental group (mobile phone) and other was control group (face-to-face). Before sending text messages to the respondents of experimental group, they were trained how to read the text messages sent by the researchers for dissemination of advisory instructions. After that a set of advisory instructions regarding precautionary measures for aphid attack on wheat crop in Urdu language was sent to experimental group through mobile phone where extension worker was unable to reach physically while the same instructions were given to control group by using face-to face traditional teaching method.

Research hypothesis

The research hypothesis was formulated as:

H_0: No significant difference exists between the mean scores of two methods of instructions.

H_1: Significant difference exists between the mean scores of two methods of instructions.

Results and Discussion

At the end of the session, post test was conducted and the scores were recorded as given below in Table 1. The test comprised of five questions and each was weighted for three points.

Table 1: *Scores of the two groups.*

S. No.	Group-1 Face-to-face	Group-II Mobile phone
1	13	9
2	10	10
3	11	9
4	13	12
5	15	11
6	9	10
7	10	9
8	8	11
9	11	9
10	10	12
11	13	10
12	9	11
13	12	15
14	8	10
15	14	10
16	11	9
17	9	12
18	13	14
19	8	10
20	12	10
21	15	12
22	8	11
23	15	13
24	12	9
25	14	11
26	10	12
27	15	9
28	8	10
29	13	10
30	14	11

Following the testing of hypotheses procedure, two-population independent t-test was applied for the comparison of the scores of the respondents after delivering instructions by two methods. According to Frederick and Wallnau (2000) the goal of independent measures research study is to evaluate the mean difference between the two populations. The data of the study were analyzed by using the statistical package for social sciences (SPSS) and the results given in the following Table 2 and 3 respectively.

Table 2: *Group Statistics.*

	group	N	Mean	Std. Deviation	Std. Error Mean
score	face-to- face	30	11.4333	2.41666	0.44122
	Mobile phone	30	10.7000	1.53466	0.28019

The Table 2 shows the mean scores and standard deviations of the two groups and seems quite similar with insignificant difference. Mean scores of the two groups indicate that respondents were equally enjoying the instructions receiving by face-to-face and by mobile phone cellular technology.

The two tables revealed that the group received set of advisory instructions by mobile phone were equally aware (*M= 10.70, SD=1.53)* as compared with the group received the same set of advisory instructions by face-to-face (*M= 11.43, SD= 2.42)* traditional teaching method for taking precautionary measures to avoid aphid attack on wheat crop. This difference was insignificant at $t\ (58) = 1.403, p>0.05$ two tailed.

Conclusions

Information technology has changed the way of life around the globe. During the last fifty years, the use of computer-based technology grab everything like magnet. There is hardly any area where one cannot observe the applications of information technology. During the last two decade the use of mobile phone cellular technology emerged as the leading medium of communication among people in the country like Pakistan. It does not make a difference whether the individual is literate or illiterate, the use of mobile phone is so easy that everyone feels comfortable and enjoying using it at home, office, shopping malls and even in open farms. Information and communication technology is a binding force and the residents of a small town consider themselves global citizens rather inhabitants of any specific town or city.

Mobile phone cellular technology is equally popular and useful for transfer of knowledge and information among the farmers in the field of agriculture. Similarly, in a study conducted by Chhachhar and Hassan (2013) in Malaysia, they emphasized the need of the

Table 3: *Independent Samples t- test.*

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
score	Equal variances assumed	11.176	0.001	1.403	58	0.166	0.73333	0.52267	-0.31290	1.77956
	Equal variances not assumed			1.403	49.118	0.167	0.73333	0.52267	-0.31694	1.78361

start of developmental projects for the use of mobile phone cellular technologies where growers could get easy access to interact or communicate with market brokers and fellow farmers to sell their agricultural products. Hence, it's proved that cellular technology is one of the best technologies that is being adopted and diffused among the farming communities in other countries as effective communication tool. Likewise, in Pakistan, the cellular technology in the field of agricultural is rapidly making its significance as a tool for transfer of knowledge or information among the farming communities. In this study, the results showed that those learners who do not have face-to-face contact with instructor, they learn and improve their awareness level regarding specific information as effectively as in traditional face-to-face method. Moreover, the use of mobile phone technology will save time and money. In other words, this technology is also cost effective in conditions where physical interaction with farmers is not possible due to different barriers in communication. In addition, more respondents may interact with the Extension Field Staff by using cellular technology.

Recommendations

Following are few recommendations for applications of information and communication technology in the field of agriculture.

- More courses may be added at graduate level degree programs for information, GIS/GPS, and remote sensing technologies used for decision making to learn new advance technologies used in agricultural development.
- Extension workers must be trained for the applications of these technologies at grass root level.
- Computer and information technologies related training must be provided at village level.
- Call centers may be opened in villages for transferring timely information regarding market rates, weather, rates of other agricultural inputs and to find out where farmers could ship their agricultural products.
- More research needs to be conducted on the use of information technology in the field of agriculture.

Author's Contribution

Ejaz Ashraf conceived the idea, overall supervised the study, contributed in data analysis and interpretation of the results. Hafiz Khurram Shurjeel prepared the set of instructions given to respondents of the two groups. Mujahid Iqbal contributed in implementation of the test and data entry.

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