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ANALYZING FACTORS HAMPERING THE INTERACTION AMONG THE SYSTEM ACTORS (EXTENSION-RESEARCH-FARMER) IN BALOCHISTAN: BRIDGING LINKS COMPENDIUM

A. A. Mengal[*1], A.Tunio[2], U. Shahani[3], F. M. Baloch[4] and I. Jatoi[5]

[1]Agriculture Research Institute, Sariab Quetta, Balochistan, Pakistan
[2]Department of Basic Engineering, [3]Department of Rural Sociology, [5]Department of Statistics, Sindh Agriculture University, Tandojam, Pakistan
[4]Department of Livestock Research Institute (PARC), Turbat, Balochistan, Pakistan

ABSTRACT

Present research sought to focus on the link among the system actors (extension-research-farming communities) in Balochistan province of Pakistan, in order to identify the limiting factors within agricultural extension system. In this regard, the Quetta district was purposively selected. A descriptive type of survey was utilized. Systematic sampling method was used in selection of one hundred (100) farmers and Extension Field Staff (EFS) as the sample for the present study. The findings revealed that links among extension, research and farmers were all but nonexistent. In this regard some informal contacts exist on the basis of discussions at various meetings and field days. However, these were mostly unplanned, un-structured and conducted entirely on an adhoc basis. They did not constitute an effective mechanism for dialogue and proper planning and review processes. The results further showed that linkages among extension, research and farmers were highly limited throughout most of the province. Based on achieved results the study recommended the bridging of the gap between potential and actual farm productivity on priority basis through the effective links among system actors (extension-research-farmer). Dissemination of improved crop production technologies should be propagated through field demonstration, effective home/farm visits, individual's/groups discussion, farmer's trainings and facilitating provision of inputs. Farmers-oriented, skill enhancement, need based, effective extension advisory services and progressive initiatives should be taken at all level in order to bridge gap among system actors.

Keywords: Balochistan, extension, link, system actors

INTRODUCTION

Linkage demonstrates the working relationship and correspondence perceived between at least two associations following regularly shared targets in order to have reliable collaboration and upgraded sustainable rural profitability (Axinn and Thorat 1972; Agbamu, 2000; Sadighi, 2005; Oladimeji *et al.,* 2006). Low crop yield and poor agriculture production has attributed due to the deprived interaction among system actors. However, effective relationships among diverse system actors (extension-research-farmer) are vital and indispensable with the term of yield enhancement for farmers. Weak relationships were characterized in a methodical bottleneck in the agricultural modernization and restrict the agricultural efficiency towards enlargement as a result of disturbance in knowledge flow (Rimawi *et al.,* 2012). Links among system actors (research-extension-farmer) were not encouraged at field level activities (Faborode and Ajayi, 2015; Margaret and Friday, 2016). On the other, hand dynamic and sustainable liaisons are part and parcel elements regarding the research-extension-farmer-input linkage system (Refils). In this regard, links among system actors are an energetic and authentic agricultural extension instrument for effective technology transfer (Nnadozie *et al.,* 2015).

The agriculture sector is the backbone of the Balochistan economy and around 67% of its work, labor forces and constitute 52% of GDP. The Balochistan province is honored with a variety of agro-climatic zones beginning from upland, lowland to deserts and coastal belt. The agriculture practices in the Balochistan province

[*]Corresponding author: ahmedagric@gmail.com

are being practiced in a unique and distinct manner as compared to other provinces of Pakistan due to its scanty populace, poorer physical infrastructure, scattered nature of settlements, extreme poverty, little horticulture land holding (situated in little pockets/valleys of remote regions) and other diverse variables (Mellor, 1994).

The rigorous improvement of agriculture sector is linked with advancement in research, which is accountable in constant evolution of innovations, however all these research efforts and endeavors are of no utilization unless these advancements are diffused among their definitive clients (farmers). This activity can skillfully be performed by a viable, expedient and proficient expansion benefit conveyance framework to prepare the rustic people to abandon primitive farming methods and to adopt the new innovations. Agriculture extension work in the Balochistan province has been very difficult and challenging job under the peculiar socio-economic conditions, with poor means of communication, dispersal of rural population with a high rate of illiteracy in the farmers (far from roads). Despite of serious constraints, lack of sound policies, and non-recognition of the role of the extension agent, agriculture extension has made a significant contribution in dissemination of scientific knowledge and improved production technologies which have helped in augmenting the crop yields and farmer's income.

With the promulgation of devolution order, the extension activities have incredibly been disrupted and disturbed and the notion of two-way flow of information and extension service delivery has almost been abolished, owing to low priority to agriculture department in resource allocation by the district set ups even to execute the minimal extension activities chalked out for the respective areas. Unfortunately, there remain subtle chances that the Extension department is serving as a bridge between the research and farming community for transfer of new technologies to the end users and bringing back farmer's problems for their re-address due to termination of the linkages at all tiers. At the same time due to these de-linked phenomena, the research results are not being properly transmitted to the farming community as the research set up is at provincial level and the extension set up has been devolved to district level. It is true that the province of Balochistan is the agriculture future of the country and the huge available potentials have not so far been exploited. Accordingly, the Department of Agriculture Extension has to play a more crucial role in exploring and utilization of potentials of the crop varieties, available technologies and other resources.

Operative agricultural extension philosophy regarding sustainable rural development based on effective links among system actors (Biam *et al.,* 2017). Vibrant linkages among the key system actors not only rousted to strengthen the organizations but also identify the worth of harmonizing information. Globally, by nature the research institutions were generating the new technology to the extension services and the agriculture extension services are serving as a bridge among the research institutions and farming communities, agriculture extension were disseminating the practical aspects of new technology towards farming communities and farmer's feedback. The extension-research-farmer triangle relationships are further most dynamic in the course of generating new interventions to farmers, and in realizing the general dual objective of upsurge food production. Research institution connections with agriculture extension are similarly essential. In their non-appearance, innovation move mechanism in a void. New interventions from research institution are not accessible, and therefore agriculture extension did not convey the new messages to the farming communities. Consequently, low crop yield and farmers to failing to improve their conditions. At province level research institution (wing) and agricultural extension wing did not deliver the appropriate agriculture information and new interventions to the farmers, both were working under their premises.

Contacts between agricultural extension wing and research institution are all but non-existent. Some informal links exist on the basis of discussions at various meetings and field days. However, these are unplanned, un-structured and conducted entirely on an adhoc basis. They do not constitute an effective mechanism for dialogue and proper planning and review processes. The weaknesses lie in its horizontal and vertical linkages and operational mechanism including the methodology used for transfer of technology (Mengal *et al.,* 2014). There is lack of mechanism for immediate identification of emerging problems and prompt response ot the technology needs of the farmers. Mostly a top-down approach is embraced and almost no efforts are made to base planning on constraints and issues being faced or to face in short and long runs. There is limited interaction with system

actors. The real implementers are totally neglected. Keeping in view above mentioned facts the present research work was designed in order to analye the hampering factors among the extension-research-farmer in Balochistan, Pakistan. The objectives of the study were: To explore the socio-economic characteristics of respondents in the study area, to find out the hampering factors affecting the linkages mechanism among the system actors**,** to develop the conceptual linkages framework and to develop the need-based and result-oriented suggestions for policy-makers and planners.

The null hypotheses were tested in the study: H_O1. There is no significant difference in current perceptions of the researchers and extensionists regarding existing linkage arrangements, H_O2. There is no significant difference in current perceptions of the public extension and farmers regarding sources of agricultural information, H_O3. There is no significant difference in current perceptions of the research, extension and farmers regarding agricultural practices.

METHODOLOGY

Descriptive type of research design was used in the present study. In this regard, the Quetta district was selected purposively due to the fact that entire agricultural activities either agricultural activation meeting, Rabi and Kharif meeting or nexuses among system actors regarding technology transfer process were carried out. The responses of the respondents were elicited by comprehensive questionnaire designed for this purpose. Comparatively, qualitative data require a smaller sample size as compared to quantitative data for analysis and describe the phenomenon of interest. However, in this regard, Morse (1994) suggested that around 30-50 participants were enough for ethnography study. Morse (1994) also recommended that 30-50 interviewers are appropriate for grounded theory, whereas Creswell (1998) suggested that only 20-30 sample sizes are adequate for phenomenological studies. Likewise, Kish (1965) recommended that 30 to 200 elements are sufficient. In addition, Sudman (1976) suggests that a sample of 20 to 50 elements is necessary. In this connection, two types of respondents were selected; group first comprised farmers and group second was consisted of Extension Field Staff (EPS) of both Wings. A sample of fifty (50) farmers and 50 EFS among them twenty-five (25) from Research Institute and twenty-five (25) from Agricultural Extension Wing Government of Balochistan were selected. The total one hundred (100) respondents were selected as target population. Systematic sampling procedure was employed in selecting respondents whereby every N^{th} number is randomly selected. Cronbach's alpha ranged from 0.71 to 0.84 on the summated Liker scale that depicted that the interval consistency was excellent (Nunnally, 1967). Both populations were determined by using McCall (1980) Table "selecting sample size from a given population" at the 0.05 percent error rate. SPSS program was used to analye the data. For comparison among and between groups, analysis of variance (DMRT) and Independent Samples *t-test* were performed. The null hypothesis 1 and 2 was verified through using Independent Samples *t-test* and one-way analysis of variance for the null hypothesis (3).

RESULTS AND DISCUSSION

The demographic information plays a vital role with the decision-making process and accelerate the adoption rate as shown in Table 1.

Table1. Distribution of respondents according to demographic information (n=100)

Public (EFS)			**Farmer Respondents**		
Education level of EFS	**F**	**%**	**Education level of farmers**	**F**	**%**
Matriculation	27	27.0	Illiterate	54	54.0
Intermediate	24	24.0	Matriculation	25	25.0
Diploma	31	31.0	Intermediate	11	11.0
Bachelor	10	10.0	Bachelor	06	06.0
Masters	04	04.0	Masters	04	04.0
Others	04	04.0	Others	00	00

The demographic information regarding educational level of public EFS reveals that most (31%) of EFS having diploma in agricultural discipline. While most (27-24%) of public EFS holding the matriculation and intermediate certificates, respectively. On the other hand, more than half (54%) of famers were illiterate. Whereas 25-11% of farmers had the matriculation and intermediate certificates, respectively.

Table 2. Distribution of respondents according to age (n=100)

Respondents	**Age**				**Total**
	18 -30 (yr.)	31-40 (yr.)	41-50 (yr.)	51 and above (yr.)	
Public extension	08	09	19	14	50
Farmers	05	14	22	09	50
Total	13	23	41	23	100

The results of Table 2 show that highest number of the public extension field staff fall in the age category of 41 to 50 years. On the other

hand, similar highest number of the farmers fall in the age category of 41 to 50 years.

Table 3. Distribution of respondents according to experience (n=100)

Respondents	Experiences				Total
	1 -10 (yr.)	11-20 (yr.)	21-30 (yr.)	31 and above (yr.)	
Public extension	22	15	10	03	050
Farmers	06	20	12	12	050
Total	28	35	22	15	100

The results of Table 3 indicate that highest number of the public extension field staff had 1 to 10 years of experiences. On the other hand, highest number of the famers had 11 to 20 years of farming experiences.

General information

A t-test was used to determine if statistically significant differences occurred between research institute EFS and extension wing EFS about wholly recognized linkage statements. The rank order was calculated on the basis of mean score in order to find out the relative ranking of each category. The responses were recorded on a 1 to 5 point Likert-type scale where 1 stands for "not at all effective", 2 "slightest effective", 3 "trend to effective", 4 "effective", and 5 was "very effective". The results are presented in Table 4. The segregated data based upon public extension field staff perceived scores regarding linkages mechanism showed that farm visits (M=1.72 "Research Institute", M=2.60 "Extension Wing") and result demonstration (M=1.56 "Research Institute", M=2.76 "Extension Wing") were highly significant ($P \leq 0.05$). Whereas home visits (M=1.88 "Research Institute", M=2.30 "Extension Wing") and conference (M=2.00 "Research Institute", M=2.54 "Extension Wing") had significantly different ($P \leq 0.05$). While field days (M=3.40 "Research Institute", M=3.54 "Extension Wing"), exhibition and display (M= 1.84 "Research Institute", M=1.94 "Extension Wing"), joint campaign (M=2.18 "Research Institute", M= 1.82 "Extension Wing"), festival (M=2.14 "Research Institute", M=2.02 "Extension Wing"), workshop (M=2.00 "Research Institute", M=1.88 "Extension Wing"), seminar (M=2.16 "Research Institute", M=2.04 "Extension Wing"), method demonstration (M=2.32 "Research Institute", M=2.10 "Extension Wing"), meetings (M=2.52 "Research Institute", M=2.06 "Extension Wing"), short courses (trainings) (M=2.06 "Research Institute", M=2.10 "Extension Wing") and information sharing (M= 2.30 "Research Institute", M=2.26 "Extension Wing") were non-significant ($P \leq 0.05$). The non-significant variables were greater in number (>50%) than the significant factors. Similar result was found by the Kimenye (2006) in Kenya who reported that a field day was the significant variable about effective linkages among researchers-extension field staff and farmers. This may be due to the reason that same linkages mechanism or systems (top-down) existed in the different regions. Therefore, H_O1 "there is no significant difference in current perceptions of the researchers and extensionists regarding existing linkage arrangements" was rejected for four (4) out of fourteen (14) categories about linkages mechanism as perceived by the extension field staff of both wings. Hence, it was concluded that comparative trend to effective linkages occurred among system actors.

Table 4. Public extension field staff perceived scores about linkages mechanism (n=50)

S #	linkages mechanism	Research Institute			Extension Wing			Std. err. diff.	t-value	Sig*
		M	SD	RO	M	SD	RO			
1.	Farm visits	1.72	0.991	13	2.60	0.990	03	0.198	-4.444	0.000**
2.	Home visits	1.88	1.043	11	2.30	1.129	05	0.217	-1.932	0.056*
3.	Field days	3.40	1.195	01	3.54	1.014	01	0.222	-.631	0.529 NA
4.	Exhibition and display	1.84	1.184	12	1.94	1.150	12	0.233	-.428	0.669 NA
5.	Joint campaign	2.18	1.101	05	1.82	1.004	14	0.211	1.709	0.091 NA
6.	Festival	2.14	1.212	07	2.02	1.270	11	0.248	0.483	0.630 NA
7.	Conference	2.00	0.808	10	2.54	0.885	04	0.170	-3.185	0.002*
8.	Workshop	2.00	1.309	09	1.88	1.043	13	0.237	0.507	0.613 NA
9.	Seminar	2.16	0.934	06	2.04	1.106	10	0.205	0.586	0.559 NA
10.	Method demonstration	2.32	1.058	03	2.10	1.199	07	0.226	0.973	0.333 NA
11.	Meetings	2.52	4.325	02	2.06	0.890	09	0.624	0.737	0.465 NA
12.	Result demonstration	1.56	1.013	14	2.76	1.170	02	0.219	-5.481	0.000**
13.	Short courses (trainings)	2.06	1.114	08	2.10	0.886	08	0.201	-.199	0.843 NA
14.	Information sharing	2.30	1.266	04	2.26	1.209	06	0.248	0.162	0.872 NA

Scale * 1= Not at all effective, 2= Slightest effective, 3=Trend to effective, 4= Effective. 5=Very effective Significant at 0.05 Level SD= Standard deviation RO= Rank order NA= Non-significant **Significant at 0.0 level

Table 5. Public extension field staff and farmers perceived scores regarding sources of agricultural information (n=50)

S #	Sources of information	Public Extension (EFS)			Farmers			Std. Error Diff.	t-value	Sig*
		Mean	SD	RO	Mean	SD	RO			
1.	Mobile phones	4.14	0.926	01	4.50	0.647	01	0.160	-2.254	0.027*
2.	Extension agents	3.06	0.978	09	1.96	0.947	12	0.192	-5.716	0.000**
3.	Neighboring farmers	3.96	0.727	02	3.88	0.918	02	0.166	.483	0.630 NA
4.	Friends	2.74	1.103	10	2.80	0.926	08	0.204	-.295	0.769 NA
5.	Newspaper	3.14	0.808	08	3.22	0.932	05	0.174	-.458	0.648 NA
6.	Dealers	3.62	1.413	03	3.60	0.833	03	0.232	.086	0.931 NA
7.	Television	3.30	1.055	06	2.72	1.031	09	0.209	2.781	0.007*
8.	Radio	3.36	0.875	05	2.60	0.948	10	0.182	4.166	0.000**
9.	NGOs	3.48	1.015	04	3.52	1.054	04	0.207	-.193	0.847 NA
10	Internet	2.04	1.277	11	2.88	0.918	07	0.222	-3.777	0.000**
11	Magazine	1.90	0.580	12	2.42	0.971	11	0.160	-3.251	0.002*
12	Pamphlet	3.24	0.894	07	3.08	1.066	06	0.197	.813	0.418 NA

Scale 1= Not at all, 2= Sometime, 3= Often, 4= Almost always, 5= Always * Significant at 0.05 Level SD= Standard deviation
**Significant at 0.0 level

Table 6. Perceived scores regarding sources of agricultural practices (n=100)

S #	Agricultural practices	Research		Extension		Farmers		F. Value	Sig*
		M	SD	M	SD	M	SD		
1.	Agronomic practices	3.16 B	987	2.32 A	945	2.08 A	966	10.565	000**
2.	Plant protection measures	3.24 B	1.012	2.44 A	1.044	3.22 B	887	06.306	003*
3.	Good agriculture practices	3.60 A	764	3.72 A	614	3.52 A	886	528	591 NA
4.	Water management practices	3.00 A	1.258	2.60 A	1.190	3.08 A	1.192	01.356	263 NA
5.	Integrated pest management	3.52 A	1.159	3.76 A	1.052	3.76 A	960	504	606 NA
6.	Disease management	2.72 A	1.173	3.04 A	1.306	2.44 A	1.033	02.350	101 NA
7.	Fertilizer application	3.52 B	918	3.08 B	954	2.74 A	828	06.573	002*
8.	Weed control	3.12 B	526	2.68 A	.690	3.18 B	919	03.573	032*
9.	New varieties	3.68 B	1.145	2.56 A	.821	2.92 A	752	10.746	000**

Scale *1= Not at all influential links, 2= Slightly influential links, 3= Somewhat influential links, 4= Very influential links, 5= Extremely influential links Significant at 0.05 level SD= Standard deviation RO= Rank order NA=Non-significant **Significant at 0.0 level

Sources of agriculture information is the imperative aspect of the present study, in this regard, the respondents were enquired about sources of information as shown in Table 5. The results show that mobile phones (M=4.14 “Public Extension (EFS)”, M=4.50 “Farmers”), neighboring farmers (M=3.96 “Public Extension (EFS)”, M=3.88 “Farmers”) and dealers (M=3.62 “Public Extension (EFS)”, M=3.60 “Farmers”) were got 1st, 2nd and 3rd rank order, respectively. While magazine (M=1.90 “Public Extension (EFS)”, M=2.42 “Farmers”) and extension agents (M=3.06 “Public Extension (EFS)”, M=1.96 “Farmers”) were at the bottom of the ranking, receptively. Ifeanyieze *et al*. (2017) found out somewhat linkage mechanism among research agencies about technology transfer dimensions (sustainable agricultural development). Belay and Dawit (2017) explored that the research-extension linkages was generally weak, neither the research wing delivered the technology to the farmers nor did the extension wing solve the farming communities need regarding the technology-oriented programs. Hence, null hypothesis-2 was rejected for six out of twelve categories and it was concluded that almost and always weak linkages existed between public extension and farming communities regarding sources of agricultural information. These activities did not constitute or match the agricultural extension philosophy.

Analysis of variance (ANOVA) on current perceptions of the respondents about agricultural practices show that highly significant differences at the ($P \leq 0.05$) alpha level, the opinions of the following possible agricultural practices areas: agronomic practice (F=10.565, $P \leq 0.05$) and new varieties (F=10.746, $P \leq 0.05$) were highly significant. Likewise plant protection measures (F=6.306, $P \leq 0.05$), fertilizer application (F=6.573, $P \leq 0.05$) and weed control (F=3.573, $P \leq 0.05$) category was significant ($P \leq 0.05$). Segregated data of agricultural practices based upon respondent’s perceptions such as good agriculture practices (F=5.528, $P \leq 0.05$), water management practices (F=.1.356, $P \leq 0.05$), integrated pest management (F=.504, $P \leq 0.05$) and disease management (F=2.350, $P \leq 0.05$) did not show any significant differences ($P \leq 0.05$). Respondents perceived that dissemination of agricultural practices by EFS did not show very influential links among key system actors.

Duncan Multiple Range Test (DMRT) was run so as to rank the mean score as shown in Table 6. Effective linkages among research, extension and farmers remain non-significant concerning with the dissemination of modern technologies. Neither public nor private sectors performed and fulfill their duties about transfer of innovative agricultural technologies to the farmers (Talib *et al*., 2017). Due to the poor linkages the farmers did not receive any adequate agricultural and capacity building programs (Khaila *et al.,* 2015). Therefore, null hypothesis was rejected for five out of nine categories about agricultural practices linkages mechanism and it was concluded that slightly influential links existed among research institute, extension wing and farming communities. Due to the non-existences of linkages mechanism among system actors the socio-economic conditions of the farming communities not yet improved.

Conceptualizing linkage framework

The constructive relationships among three main pillars i.e. research-extension-farmers were prerequisite to obtain the joint venture aims towards supportable agriculture development. By the way, total agricultural system and their efficiency mainly depend on robust linkage mechanism among key system actors. In addition, the prevailing research-extension-farmer's connection has not been able to fulfill the present necessities of the farming communities. So, absence of solid connection as a result of the technology transfer flow and adoption rates of the new know-how was limited, hence which enlarged the time lags between growth and adoption of new technology. Vision of linkage relies on operational communication ground on working relationship among organizations following generally shared goals so as to better-quality productivity (Agbamu, 2000; Sadighi, 2005). Vibrant linkages among the key system actors not only rousted to strengthen the organizations but also identify the worth of harmonizing information with the context of approaches. The current policy environment, which sanctioned the laws and incentives that effect agricultural performance, structural conditions like inputs, outputs, and resource base; the authority arrangement that influence the entire system. (Anandajayasekeram *et al.,* 2008).

The conceptualizing linkages frame work developed (Figure 1) on the basis of the recommendations received for public and private extension field staff and with the available literature, present linkages frame work was designed in order to stimulate the effective link of key system and encourage the bottom-up approaches aiming to fill the information gap and provide a significant edge for the entire province agricultural extension system. The focal point of the model was consolidating the extension, research and farmer's collaboration with the term of linkages and feedback by farmers. A participatory approaches and collective approaches were strengthening the linkages vision. The current model defines how long public extension services (extension and research) can make an effective linkage through collaborative efforts at the farm level with the term of resource base infrastructure. Furthermore, there is also essential to jump the exchange of information and constant communication among the key system for the policy implication context so as to improvement of agricultural progress on the supportable base can be achieved through effective technology transfer process. Joint cooperation and empowerment among system actors regarding research intervention could be achieved through the impetus collaboration.

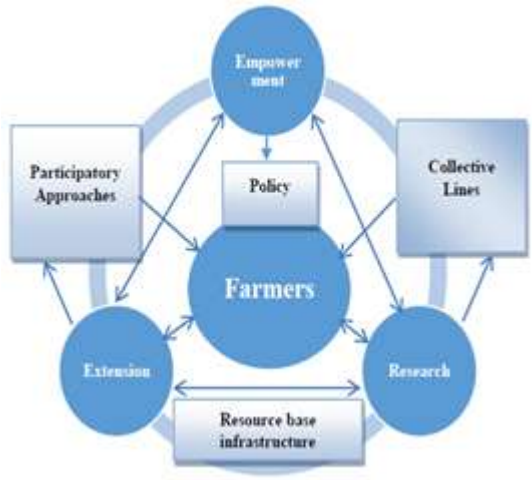

Figure 1. Conceptualizing linkages framework of key system actors (Anandajayasekeram *et al*., 2008)

CONCLUSION AND RECOMMENDATION

The findings of the present study showed almost non-existence links among the Agriculture Research Institute, Agricultural Extension Wing and farming communities. The findings further depicted that hypothesis 1 which was rejected four out of fourteen categories about linkages mechanism. Comparatively not at all effective linkages occurred among system actors.

However, null hypothesis 2 was rejected for six out of twelve categories and it was concluded that almost and always weak linkages exist between public extension and farming. Further, null hypothesis 3 was rejected for five out of nine categories about agricultural practices linkages mechanism and it was concluded that slightly influential links existed among research institute, extension wing and farming communities. Based on achieved outcomes following recommendations put forwarded. Bridging the gap between potential and actual farm productivity on priority bases through the effective links among system actors (extension-research-farmer) should be suggested. Dissemination of improved crop production technologies should be propagating through field demonstration, effective home/farm visits, individual's/groups discussion, farmer's trainings and facilitating provision of inputs. Farmers-oriented, skill enhancement, need based, effective extension advisory services and progressive initiatives should be taken at all level in order to bridge gap among system actors.

AUTHOR'S CONTRIBUTION

A. A. Mengal: Data collection.
A. Tunio: Data collection and interpretation.
U. Shahani: Assisted in paper writing.
F. M. Baloch: Collected and compilation of data.
I. Jatoi: Literature review.

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