

## An Investigation of Effective Factors Involved in Perception of Wheat Farmers Regarding On-Farm Demonstration in Isfahan Township, Iran

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**Abstract:** The purpose of this study was to determine the influence of on- farm demonstration on the wheat farmers' technical knowledge in Isfahan Township, Iran. Wheat farmers have been selected using stratified randomization method (n=381). The comparison of two wheat farmers (visited and not visited) showed that technical knowledge of wheat farmers who visited on-farm demonstration was higher than those who did not visit; also those who visited have used breeding variety and mechanization method in comparison with those not visited. The results showed wheat farmers had more technical knowledge that has agronomy and horticulture farming systems, those have mechanization method in wheat culture and wheat farmers used breeding variety. The results obtained from the factors analysis revealed that the three following factors, social, farming and personal characteristics explain 68.072% of the variation of the wheat farmers' technical knowledge.

**Key words:** On-farm demonstration • Technical knowledge • Wheat farmers

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### INTRODUCTION

Agricultural research is vital to addressing the challenges of food production in Iran. Also One of the main challenges that extension and research is currently confronted with is the transfer of agricultural technology from the research stations to the farm lands [1]. By taking into account the rapid technological and scientific growth, the problem gets even more sophisticated and intricate. On-farm demonstration have served as one of the most effective extension education tools ever developed. The need for such demonstrations was first recognized by Seaman Knapp when he found that farmers would not change their methods of farming unless they conducted the demonstration themselves on their own farms under ordinary conditions. In the on-farm demonstration, new technologies are applied into the agricultural lands by the farmers themselves and are subsequently presented to others. On-farm demonstration generates easy, informal conditions which allow the farmers to enhance their own knowledge on an autodidactic manner. At the same time, it offers them the opportunity to get acquainted with new technologies.

On-farm demonstration creates a dynamic and organized relationship among researchers, extension workers and farmers that allows the flow of information and new ideas among themselves that boosts the whole agricultural development. Each year, numerous on farm research and demonstration project are conducted all over the country. However, much of this research is not utilized to its full potential because there are no organized efforts to compile and distribute the research findings Chizari, Lindner. An On-farm demonstration allows innovative practices or solutions to problems to be demonstrated on an actual farm situation to show its viability or applicability. The demonstration may employ before-and-after, control-versus-test, side by side or other comparisons. Practical application of an innovation or practices focusing on relevant issues or problems is usually the primary objective of such demonstrations [2].

Various studies have demonstrated that on-farm demonstration is by far the most effective extension teaching method Chizari *et al.* [3] Martin and Sajilan [4] Eke and Emah [5] Ajayi [6] Riesenber and Obel Gor [7] Ford [8] Chizari *et al.* [9] Agahi [10] Obahayujie and Hillison [11] Umeh [12]. All extension clientele seems to

like to learn and gain new knowledge in this type of transferring knowledge [7]. But, considering the widespread use of on-farm demonstration evaluations of educational effectiveness are surprisingly rare. Educational programs need to be evaluated to allow educators to choose among various teaching methods techniques and activities, or delivery styles. Because monetary resources are limited in extension education, they should be spent only for programs that have been demonstrated to be both popular and effective [13].

Goal of on-farm demonstration is technology transfer and adoption by farmers. We have to consider to following for achievement to this goal:

- On-farm demonstrations have to base on development of farmers' knowledge and awareness.
- On-farm demonstrations would be coordinate with farmers' developing culture.
- On-farm demonstrations must be coordinate with farmers' climate condition.
- On-farm demonstrations should be appropriate with farmers' economic condition.
- On-farm demonstrations would have coordination with farmers' facilities, technical power and talent.

In additional to aim of on-farm demonstrations is facilitating information exchange among farmers, extension workers and researchers, decreasing of farmers' dependence on agricultural input and increasing of farmers' management power.

An another goal is delivery of training program with the best management procedure for high yield and decreasing of environmental danger, providing proper condition for increasing adoption rate in farmers, demonstration of management systems and help researchers and extension workers for evaluation of agricultural systems under real condition.

On-farm demonstrations were combination of extension teaching methods that need to local concentration. We must be expand a network of these farms to many farmers can visit them and were improved their productivity economically and environmentally.

**Purpose:** The purpose of this study was to determine the influence of on- farm demonstration on the wheat farmers' technical knowledge in Isfahan Township, Iran. Specific objectives were to:

- Describe wheat farmers by personal, farming and social characteristics.
- Determine wheat farmers' technical knowledge and compare in two groups of wheat farmers (those who visited on-farm demonstration and those who did not).
- Determine wheat farmers' agricultural systems and it's relationships with their technical knowledge and compares them in two groups of wheat farmers (those who visited on-farm demonstration and those who did not).
- Compare two groups of wheat farmers, those who visited on-farm demonstration and those who did not.
- Determine relationship between wheat farmers' personal, farming and social characteristics and their technical knowledge.
- Determine Effective factors on wheat farmers' technical knowledge using factors analysis.

**Methods:** Wheat farmers (N=19800) in the Esfahan Township were the target population for this study. Wheat farmers have been selected using stratified randomization method (n=381). The methodological approach of this study is twofold: descriptive-correlative and causal-comparative. The Ministry of Agriculture's Extension Organization Directory was used to locate the wheat farmers. From review of literature, the researchers developed an instrument to collect data. Content and face validity were established by a panel of experts consisting of faculty members and graduate students at Tarbiat Modarres University, Iran. A pilot test was conducted with 30 wheat farmers.

Questionnaire reliability was estimated by calculating Cronbach's alpha. Reliability for the overall instrument was estimated at .87. The independent variables of this study were: personal and farming characteristics (age, education level, distance between the farm and the agricultural service center, wheat farming experience, size of wheat cultivated land holding, wheat yield per hectare and the mechanization level) and social characteristics (wheat farmers' attitude toward on-farm demonstration, wheat farmers' social status, the extend of their familiarity with medias, the extend of their social participation and the extend of their use of communication channels). The dependant variable of the study was wheat farmers' technical knowledge.

Table 1: Describe wheat farmers' personal and farming characteristics

Variable	Visited (n=69)		no visited (n=322)	
	f	% of f	f	% of f
<b>Age(year)</b>				
22-35	10	16.9	106	32.9
36-45	24	40.7	119	36.9
46-70	25	42.4	97	30.2
<b>Education level(year)</b>				
Illiterate	9	15.3	69	21.4
Primary(1-5)	8	13.6	122	37.9
Secondary (6-9)	28	47.5	120	37.3
High school(10-12)	12	20.3	11	3.4
Graduate(13-14)	2	3.4	0	0
<b>Wheat farming experience(year)</b>				
2-10	2	3.4	16	5
11-20	16	27.1	134	41.6
21-30	28	47.5	117	36.3
31-55	13	22	55	17.1
<b>Wheat yield per hectare(Ton)</b>				
3-6	4	6.8	143	44.4
6.1-8	32	54.2	160	49.7
8.1-9.5	23	39	19	5.9
<b>Size of wheat cultivated land holding(hectare)</b>				
0.5-1.5	6	10.2	82	25.5
1.6-3	8	13.6	127	39.4
3.1-6	31	52.5	82	25.5
6.1-20	14	23.7	31	9.6
<b>Mechanization level</b>				
Very low(31-40)	0	0	42	13
Low(41-60)	3	5.1	59	18.3
Moderate(61-80)	13	22	111	34.5
High(81-100)	17	28.8	83	25.8
Very high(101-119)	26	44.1	27	8.4

Table 2: Describe wheat farmers' social characteristics

Variable	Visited (n=69)		no visited (n=322)	
	f	% of f	f	% of f
<b>Wheat farmers' attitude toward on-farm demonstration</b>				
Moderate	0	0	2	0.6
High	27	48.8	239	74.2
Very high	32	54.2	81	25.2
<b>Social status</b>				
Moderate(8.1-12)	5	8.5	164	50.9
High(12.1-16)	16	27.1	134	41.6
Very high(16.1-20)	36	61	24	7.5
<b>Familiarity with medias</b>				
Very low(0-3)	2	3.4	0	0
Low(3.1-6)	6	10.2	80	24.8
Moderate(6.1-9)	5	8.5	135	41.9
High(9.1-12)	36	61	88	27.3
High(9.1-12)	12	20.3	19	5.9
<b>Social participation</b>				
Very low(0-6)	0	0	3	0.9
Low(6.1-12)	12	20.3	183	56.8
Moderate(12.1-18)	42	71.2	129	40.1
High(18.1-24)	5	8.5	7	2.2
<b>Use of communication channels</b>				
Low(41-60)	1	1.7	132	41
Moderate(61-80)	20	33.9	147	45.7
High(81-100)	38	64.4	43	13.3

**Findings:** Describe wheat farmers by personal, farming and social characteristics. Wheat farmers who participated in the study ranged in age from 22 to 70 years. The mean age of respondents was 41.7 years. All wheat farmers were male. Wheat farmers were asked to report their highest level of education: 34.1% of wheat farmers had an elementary education; 20.5% were illiterate; 38.8% had secondary education; 6% had high school diploma; 0.5% had post high school education. Wheat farmers were asked to indicate the number of years of farming experience that they possessed. Years of farming experience ranged from 2 to 55 years (M=23.7; SD=8.8). The average size of wheat cultivated land holding was 3.9 hectare. The average distance between the farm and the agricultural service center was 10.54 km.

The average wheat yield per hectare was 6.7 Ton. The level of mechanization ranged from 31 to 119 (M=73; SD=23.5). The wheat farmers' attitude toward on-farm demonstration ranged from 22 to 40 (M=34; SD=2.44). The wheat farmers' social status

ranged from 4 to 20 (M=9.24; SD=2.96). The wheat farmers' familiarity with medias ranged from 0 to 15 (M=5.49; SD=2.68). The wheat farmers' social participation ranged from 0 to 30 (M=12.64; SD=3.22). The wheat farmers' use of communication channels ranged from 9 to 45 (M=21.83; SD=5.5). Responders' personal, farming and social characteristic (in two groups of wheat farmers) has been showed in Tables 1 and 2.

Determine wheat farmers' technical knowledge and compare in two groups of wheat farmers (those who visited on-farm demonstration and those who did not). For assessment of wheat farmers' technical knowledge 20 questions asked about wheat cultivation. Each question had four options, (correct=3, mostly correct=2 and incorrect=1). In regard to this scoring, maximum is 60(20\*3) and minimum is 20(20\*1). The wheat farmers' technical knowledge ranged from 27 to 60 (M=42.27; SD=5.53). Responders' technical knowledge (in two groups of wheat farmers) has been showed in Table 3. Also the comparison between two groups of wheat farmers' technical knowledge has been showed in Table 4.

Table 3: Describe wheat farmers' technical knowledge

State	Visited (n=69)		no visited (n=322)	
	f	% of f	f	% of f
Low(27.1-35)	0	0	45	14
Moderate(35.1-43)	2	3.4	189	58.7
High(43.1-51)	36	61	86	26.7
Very high(51.1-60)	21	35.6	2	0.6

Table 4: Compare wheat farmers' technical knowledge (visited and not visited)

Variables	Visited (n=69)		no visited (n=322)		t	p
	M	SD	M	SD		
Wheat farmers' technical knowledge	50.03	4.15	40.85	4.48	15.41**	0.000

\*p<0.05 \*\*p<0.01

Table 5: Describe wheat farmers' agricultural systems

Variable	Visited (n=69)		no visited (n=322)	
	f	% of f	f	% of f
<b>Farming system</b>				
Agronomy	37	62.7	170	52.8
Agronomy and husbandry	18	30.5	91	28.3
Agronomy and horticulture	3	5.1	31	9.6
Agronomy, husbandry and horticulture	1	1.7	30	9.3
<b>land ownership</b>				
Private	33	55.9	190	59
Tenant	13	22	49	15.3
Both of them(private and tenant)	13	22.1	88	25.7
<b>Cultivation method</b>				
Mechanization	36	61	108	33.5
Manual	8	13.6	134	41.6
Both of them(mechanization and manual)	15	25.4	80	24.8
<b>wheat Variety</b>				
Local	2	3.4	25	7.8
Breeding	47	79.7	171	53.1
Both of them(local and breeding)	10	16.9	126	39.1

Table 6: Determine relationship between agricultural systems and wheat farmers' technical knowledge

Variables		SD	F	p	L.S.D test
Farming system			8.482	0.000**	1,3>2,4
Agronomy(1)	43.17	5.52			
Agronomy and husbandry(2)	40.89	5.84			
Agronomy and horticulture(3)	42.98	4.05			
Agronomy, husbandry and horticulture(4)	39.35	3.64			
land ownership			0.472	0.702	-
Private(1)	42.41	5.56			
Tenant(2)	42.58	5.64			
Both of them(3)	41.51	5.27			
Cultivation method			41.257	0.000**	1>3>2
Mechanization(1)	45.16	5.47			
Manual(2)	39.85	5			
Both of them (3)	41.54	4.31			
wheat Variety			36.797	0.000**	2>3>1
Local(1)	37.69	5.45			
Breeding(2)	44.13	5.62			
Both of them(3)	40.21	3.96			

\*\*p<0.01

Also result of Chi-square test showed there is significant difference between cultivation methods and seed varieties in two groups of wheat farmers. It means that wheat farmers who visited from on-farm demonstration have used breeding variety and mechanization method in comparison with those not visited (Table 7).

Table 7: Compare wheat farmers' agricultural systems in two groups (Visited and not Visited)

Variables	Chi-square	p
Farming system	5.704	0.127
land ownership	1.952	0.582
Cultivation method	20.498	0.000**
wheat Variety	14.365	0.001**

Determine wheat farmers' agricultural systems and it's relationships with their technical knowledge and compares them in two groups of wheat farmers (those who visited on-farm demonstration and those who did not). Table 5 showed agricultural systems in two groups of wheat farmers. The result showed that 62.7% of visitors have been agronomy farming system, 55.9% private ownership, 61% mechanization culture method and 79.7% breeding seed. Also 52.8% of wheat farmer that no visited of on-farm demonstration have been cultivation agricultural system, 59% private ownership, 33.5% mechanization culture method and 53.1% breeding seed.

The result of one way ANOVA showed there is significant difference between wheat farmers' technical knowledge in relative to farming systems, wheat cultivation methods and wheat variety. The wheat farmers had more technical knowledge that has agronomy and agronomy and horticulture farming systems, those have mechanization method in wheat culture and wheat farmers used breeding variety (Table 6).

**Compare Two Groups of Wheat Farmers, Those Who Visited On-farm Demonstration and Those Who Did Not:**

Among the averages of the variables of age, education level, wheat farming experience, size of wheat cultivated land holding, distance between the farm and the agricultural service center, wheat yield per hectare, mechanization level, wheat farmers' attitude toward on-farm demonstration, their social status, their familiarity with medias, their social participation, their use of communication channels and wheat farmers' technical knowledge, significant differences are exposed when the two groups of wheat farmers meaning, those who visited on-farm demonstration farming and those who did not, are compared together (Table 8).

Determine relationship between characteristics of wheat farmers and their technical knowledge. The relationships between the variables of education level, wheat farming experience, size of wheat cultivated land holding, wheat yield per hectare, mechanization level, wheat farmers' social status, the extend of their familiarity with medias, the extend of their social participation and

Table 8: Compare characteristics of wheat farmers in two groups (Visited and not Visited)

Variables	Visited (n=69)		no visited (n=322)		t	p
	M	SD	M	SD		
Age	44.03	9.12	41.31	9.61	2.1*	0.04
Education level	7.05	4.15	4.9	3.22	4.48**	0.000
Wheat farming experience	26.1	8.51	23.29	8.83	2.32*	0.023
Size of wheat cultivated land holding	7.46	4.81	11.1	8.78	-3.09**	0.002
Distance between the farm and the agricultural service center	6.09	4.49	3.48	2.91	5.77**	0.000
Wheat yield per hectare	7.82	1.01	6.47	1.22	9.13**	0.000
Mechanization level	90.86	20.75	69.75	22.55	7.09**	0.000
Wheat farmers' attitude toward on-farm demonstration	35.41	2.84	33.85	2.29	4.63**	0.000
Social status	12.89	2.76	8.57	2.47	11.24**	0.000
Familiarity with medias	7.67	2.5	5.06	2.49	7.61**	0.000
Social participation	15.34	3.23	12.14	2.96	7.07**	0.000
Use of communication channels	27.98	4.02	20.7	4.95	10.68**	0.000

\*p<0.05 \*\*p<0.01

Table 9: Determine relationship between wheat farmers' characteristics and their technical knowledge

Variables	r	p
Age	0.063	0.217
Education level	0.3**	0.000
Wheat farming experience	0.128*	0.012
Size of wheat cultivated land holding	0.433**	0.000
Distance between the farm and the agricultural service center	-0.169**	0.001
Wheat yield per hectare	.488**	0.000
Mechanization level	0.528**	0.000
Wheat farmers' attitude toward on-farm demonstration	0.063	0.216
Social status	0.683**	0.000
Familiarity with medias	0.658**	0.000
Social participation	0.615**	0.000
Use of communication channels	0.68**	0.000

Table 10: Rotated factor loadings for wheat farmers' technical knowledge

Abbreviated items	Factor loadings <sup>a</sup>
Factor one = social characteristics	0.679
Social status	0.861
Familiarity with medias	0.897
Social participation	0.876
Use of communication channels	0.748
Factor two = farming characteristics	
Size of wheat cultivated land holding	0.711
Distance between the farm and the agricultural service center	-0.419
Wheat yield per hectare	0.779
Mechanization level	0.849
Factor three = personal characteristics	
Age	0.944
Education level	0.748
Wheat farming experience	0.926

<sup>a</sup>factor loading< 0.4 were omitted

Table 11: Percent of variance explained by factors underlying wheat farmers' technical knowledge

Factors	Percentage	Cumulative Percentage
Social characteristics	25.149	25.149
Farming characteristics	22.399	47.547
Personal characteristics	20.524	68.072

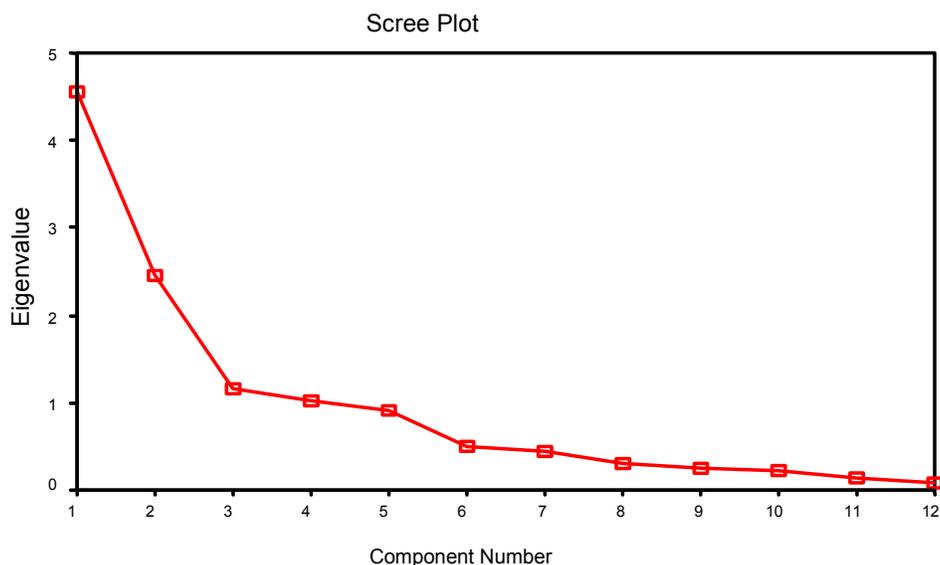


Fig. 1: Scree plot for determining number of factors

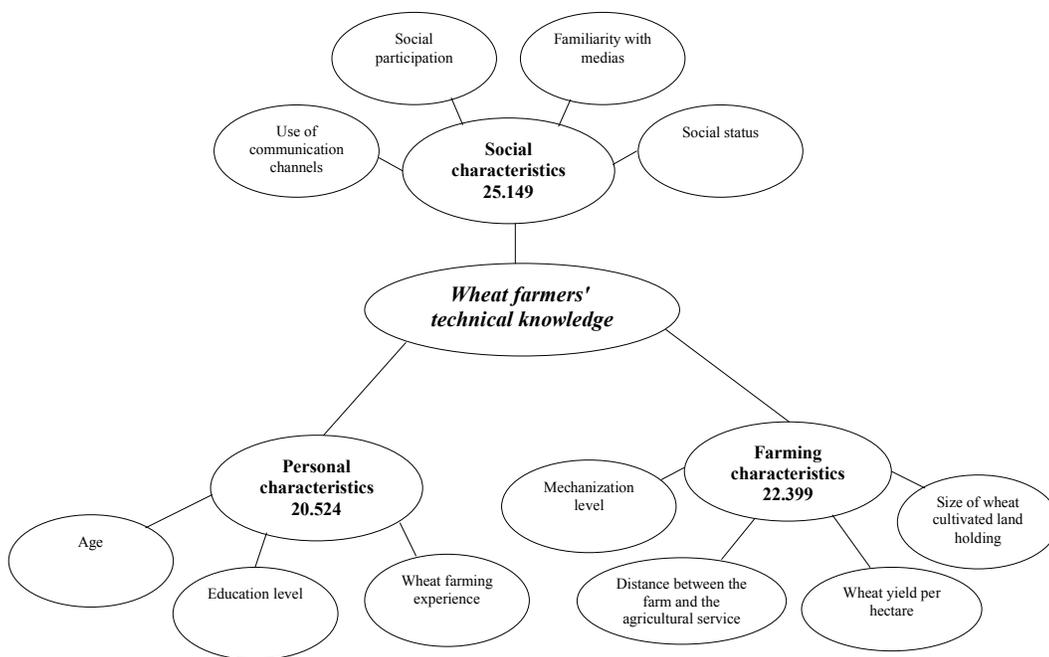


Fig. 2: Explaining the variance of each of factor

the extend of their use of communication channels were significantly correlative and positively linked with their technical knowledge. Relationship between the distance between the farm and the agricultural service center and wheat farmers' technical knowledge was significantly correlative and negative (Table 9).

Table 10: shows the rotated factor loading for the final solution. An examination of the items and their factor loadings was used to understand the nature of the three

factors. To reduce subjectivity, items with factor loading equal to or greater than 0.4 were considered most important when factors were labeled. The three factors were labeled (1) social characteristics, (2) farming characteristics and (3) personal characteristics. The results obtained from the factors analysis reveal that the three following factors, social, farming and personal characteristics explain 68.072% of the variation of the wheat farmers' technical knowledge (Table 11; Figure 2).

### **Determine Effective Factors on Wheat Farmers' Technical Knowledge Using Factors Analysis:**

By using Bartlett's test and KMO test determine whether research variables are appropriate for factor analysis (KMO=0.806; Bartlett=2898.9, sig=0.000). The number of factors was determined using Scree plot, Eigenvalue and percent of variance (kalantari, 2003), (Figure 1).

### **CONCLUSIONS AND RECOMMENDATIONS**

Based on the finding of this study, the following conclusion were drawn and recommendation given. Regarding to low less of wheat farmers' technical knowledge who don't visited of on-farm demonstration in comparison with those visited, therefore visiting of on-farm demonstration is recommended. In determination of relationship between agricultural systems and wheat farmers' technical knowledge reveal wheat farmers have had more technical knowledge that have use from mechanization method and breeding variety. Also the comparison of agricultural systems between two groups of wheat farmers (visited and not visited of on-farm demonstration) showed that visited wheat farmers have used from mechanization method and breeding variety, in base we proposed that facilities for visiting of on-farm demonstration are provide to improved wheat farmers' agricultural systems and increased their technical knowledge. In comparing the two groups of farmers (visited and not visited farm demonstration), it was found that visited farmers were younger, more literate, had more farming experience, had higher yield, used machineries in their farming practices. On the other hand not visited farmers they were less involved in social participations, used less mass Medias such as radio and television as a learning tool and felt less optimistic in visiting farm demonstrations in the future. Therefore, Agricultural Colleges and the Ministry of Agriculture (that there are responsible to establish and visit of on-farm demonstration) should develop and deliver programs to encourage more farmers visit on-farm demonstrations.

In determining relationships between independent variables and technical knowledge of wheat farmers, a positive relationships were found between the wheat farmers which had higher technical knowledge in farming were more educated, had more farming experience, used advance farming technology and used more mass medias. Therefore, the conclusion can be made that the Extension Organization of Iran can use these farmers as a role model for other wheat farmers, so they can provide information to fellow farmers in their farming activities.

In factorial analysis it was determined that social, personal and agricultural characteristics of subjects were the three factors which explain 68.72% of changes in the technical knowledge of wheat farmers. Therefore we recommended on-farm demonstration must be adapted and coordinate with wheat farmers' personal, social and farming characteristics.

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