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Effective Elements on Technical Knowledge of Agricultural Section for Sustainable Soil Management

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ABSTRACT

The main purpose of this study was to carry out a comparative analysis of effective elements of repercussion farmers of Garmsar province for sustainable soil management. The methodological approach in the research was a descriptive-correlation, where the survey type was applied. Using a proportional stratified sampling technique with Cockran formula, 184 farmers in Garmsar were selected. A total of 192 questionnaires were collected and analysed. The content and the face validity of the instrument was specified after several times of review and correction by the faculty members of Agricultural Extension and Education of Azad university of Garmsar, specialists in the Ministry of Jehad, graduate students of Agricultural extension and education, experts and local farmers in Garmsar. The reliability of the analysis was conducted through 30 questionnaires and Cronbach's Alpha values for the Varamin's farmers of the instrument were estimated as 91% using statistical SPSS software. Results show that participations in educational durations, educational level of beneficiaries, the quantity of media usage, type of their jobs, their knowledge of sustainable development, type of their drove, the amount of present extensional services to farmers were significant at 95% level, with the amount of technical knowledge of farmers about sustainable soil management. Meanwhile, the farmers' income, their family members, effectiveness of basic product, the amount of their experience in agriculture, their penchant to agricultural activities, social altitude, cultural trait, their attitude to soil sustainable development, the amount of convenience, farm areas were also found to be significant at 99% level, with the amount of technical knowledge of farmers about sustainable soil management. Multiple regressions indicated that 68% of the variance in the dependent variable could be explained by the effectiveness of basic product, economical situation, and social situation, personal elements, educational-extensional elements.

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INTRODUCTION

Soil is one of the most important resources of every country. Nowadays, soil erosion is considered as a serious threat to people's welfare and their lives. In some areas where people do not control the soil erosion, they will envisage soils with low productivity. Soil erosion has different unfavourable effects such as impoverish soil and canal tartar. As a result, soil safekeeping is an important topic.

The World Bank (2006) describes sustainable soil management as a retinue of the ability of meadow to product, preservation of commercial and productivity potential, conservation of canals to store water, some expediency to stoppage erosion, and also a way to decrease the damages of incorrect usage.

The Iranian Ministry of Forest and Natural Resources (2005) indicated that the current average level of erosion in the country is more than 35 tons per hectare, which is extremely high when compared with the corresponding values in Europe (0.9 t/h) and America (4 t/h); it is very calamitous. The result is deletion of desirable farms and of course social and economical crisis such as poverty and migration. The main reasons for this problem are violent decrease of pastures which is due to the lack of proper management, unfavourable technologies utilization to exploit farms and exploit farms regardless of soil and water sustainability.

The main reasons for farms destruction are some beneficiaries, which use the farms without technical knowledge. Linear development systems are designed based on wisdom, participation and ability of farmers; hence attention to beneficiaries' knowledge about development precinct can be an important principle which is unfortunately often ignored (Dialla, 1994). The main reason of such behaviour is the lack of relation between research science and the villagers information. In fact, it is an important point that agricultural development has an irrelevant meaning because many people ignore the needs, genius, experiences, knowledge and situation of the people in specific locations and change agents just to promote new and modern technologies regardless of their situation (Kazemi *et al*., 2007).

Latest studies have shown that when we consider indigenous knowledge and technology in order to soil conservation and it can have positive effects in farmers' participation in improvement, revision water and soil management methods (Kazemi & Shavali, 2003). Chizari and Ghadimi (2001) in a research on the comparison of multi-criteria evaluation methods on sustainable management of water resources of Khorasan's Qare-Qum watershed indicated that planners of water resource development prefer formulating plans in which a set of projects with the highest productivity of existing resources, as well as the most effective participation in meeting the conflicting goals of concerned groups and decision makers, were selected. The

results show that the evaluation methods based on UTA, depending on the type of problem, present a better approach for making decision in relation to prioritization compared to other evaluation methods.

Rezaei and Shafei (2007) carried out a study to determine the effects of technical knowledge of farmers on the production of grape in Ballo village in Urmia city with regard to the importance of reforms in traditional agricultural methods, usage of modem technologies and need of training farmers, modem techniques, the effect of farmers' technical knowledge on grape production. They found that the experience, training and use of cordon method had significant and positive effects on production. However, some variables like age, education and being farmer as a main job did not have any significant effects. These findings indicate that sharing of traditional knowledge is more than other variables in the production process and the importance of training farmers by modem technologies, and therefore, it is suggested.

Kalantari and Mirgohar (2003), in a research investigating the factors affecting the technical knowledge level and its application and their roles in irrigated wheat yield in Tehran and Isfahan province, indicated that the most important independent variables which describe the level of technology application are technical knowledge level, using knowledge sources, distance from agricultural service centres, attitude to extension programs and ownership of machinery. These factors constitute 46.9 percent of the technology application variation. It was also found that the level of technology application, times of urea fertilizer usage, technical knowledge level and using micro fertilizers described 34.4 percent of wheat yield variation. The t-test results indicated that there was no significant difference between technical knowledge level and technology application.

In Garmsar Township, irregular consumption of chemical muck and lack of sustainable management usage are the reasons for severe destructions of farms and low soil productivity. Jehad specialists reported that most of the farms do not have sufficient productivity and productions slump are seen frequently (Amininasab, 2008). Therefore, the main purpose of this study is the regression analysis of effective elements on technical knowledge of agricultural section about sustainable soil management in Garmsar township. The objectives of this study are to:

- determine the knowledge level of Garmsar agricultural beneficiaries for sustainable soil management. Priorities of Garmsar agricultural beneficiaries' attitudes about sustainable soil management.
- Priorities of Garmsar agricultural beneficiaries' viewpoint about cultural, social, economic, legal-infrastructural, educational-extension factors on sustainable soil management

MATERIALS AND METHODS

The methodological approach in the research was a descriptive correlation and applied

of the survey type. A questionnaire was developed from a review of literature to collect relevant data. The content and face validity of the instrument was specified after several times of review and corrections by the faculty members of Agricultural Extension and Education of Azad university of Garmsar, specialists in the Ministry of Jehad, graduate students of agricultural extension and education, as well as experts and local farmers in Garmsar. The reliability of analysis was conducted through 30 questionnaires and the Cronbach's Alpha values for the Varamin's farmers of the instrument were estimated at 91% using the statistical SPSS software. Using the proportional stratified sampling technique with Cockran formula, 184 farmers in Garmsar were selected out of a total of 8875 population. Finally, 192 questionnaires were collected and analysed.

RESULTS AND DISCUSSION

Table 1 shows that the maximum frequency (61 persons) covers the 41-50 age range. In addition, 99.78% (191 persons) are males and on 1 (0.5%) female. Educational level analysis of farmers shows that the maximum frequency includes reading and writing only and 35% of them have more than a diploma or a degree (Table 2). Table 4 shows three (3) maximum frequencies (23.4%) of the farmers participated in educational durations as very low and 55% of the farmers do not participate in these durations. In fact, most of the beneficiaries do not participate in the educational durations.

TABLE 1
Frequency distribution of respondents' age

Age	Frequency	Percentage	Cumulative Percentage
Until 20 years	3	1/6	1/6
20-30 years	30	15/6	17/2
31-40 years	55	28/6	45/8
41-50 years	61	31/8	77/6
51-60 years	27	14/1	91/7
More than 60 years	15	7/8	99/5
No response	1	0/5	100
Total	192	100	---

TABLE 2
Frequency distribution of respondents' educational measure

Educational measure	Frequency	Percentage
Illiteracy	28	14/6
Reading & writing	49	25/5
Elementary	11	5/8
Guidance	20	10/4
High school	15	7/8
Diploma	30	15/6
Associate degree	22	11/5
Bachelor of science	12	6/3
No response	5	2/6
Total	192	100

TABLE 3
Frequency distribution of respondents' participation in educational durations

Participate in educational durations	frequency	percentage
Zero	43	22/4
Very low	45	23/4
Low	19	9/9
Moderate	20	10/4
High	41	21/4
Very high	22	11/5
Total	192	100

This section discusses the agricultural knowledge of farmers to evaluate their knowledge about sustainable soil management. The information presented in Table 4 indicate that their knowledge about sustainable soil management is partly low (2/57).

Meanwhile, priority of farmers' incompetence in knowledge shows that the top priorities are optimization of products nutrition, distinguishing of chemical shortages symptom, the amount of soils acidity and salty, soil porosity, tillage alternation and planting systems, the amount of organic materials of soil and water consumption.

In order to study the farmers' attitude, 22 statements were chosen to be scored using the Lickert scale. The results were found to be quite varying, ranging from complete disagreement to complete agreement. The farmers stated that they must undertake the responsibility of soil sustainability protection and that the chemical muck has a destruction effect on soils and the most important factor on soil sustainability is preservation of leftover herbaceous, cultivate various plants and used animal wafer in the farms. The last priorities of the farmers in this section include the only attendance to profit, accomplishing educational activities in order to sustainable soil management and encourageing other farmers to do sustainable soil management.

Correlation matrix was done to study the role of different variables on farmers' knowledge about soil management (Table 7). Some variables such as participation in educational durations, level of education, the level of media usage, type of beneficiaries' job, the level of farmers' knowledge on sustainable development, drove number and the level of extension services presentation to beneficiaries were significant with 95%

TABLE 4
Frequency distribution of respondents' knowledge about sustainable soil management

Respondents' knowledge about sustainable soil management	Very Low		Low		Moderate		High		Very High		PRIORITY
	Freq	Perc	Freq	perc	freq	perc	freq	perc	freq	perc	
Optimization of products nutrition	28	14.6	112	58.3	32	16.7	12	6.25	8	4.2	1
Distinguish of chemical shortages symptom	30	15.6	99	51.6	43	22.4	14	7.3	6	3.1	2
The amount of soils acidity and salty	19	9.9	95	49.5	51	26.6	16	8.3	11	5.7	3
Soil porosity	8	4.2	54	28.1	95	49.5	19	9.9	16	8.3	4
tillage alternation and planting systems	8	4.2	44	22.9	87	45.3	42	21.9	11	5.7	5
The amount of organic materials of soil	5	2.6	29	15.1	85	44.3	59	30.7	14	7.3	6
Water consumption	4	2.1	25	13	77	40.1	60	31.3	24	12.5	7

TABLE 5
Priority of farmers' attitude in relation to sustainable soil management

Farmers' attitude in related to sustainable soil management	Mean	Standard Deviation	Priority
Undertake the responsibility of soil sustainability protection with farmers			1
Chemical muck has a destruction effects on soils			2
The most important factor on soil sustainability is Preservation of leftover herbaceous			3
cultivate various plants			4
Used **Animal wafer** in the farms is better than chemical muck			5
People Wrong activities is one of the reasons of soil destruction			6
Soil is the natural resources that produced in long time			7
Sustainable soil management don't do because of farmers low financial			8
Sustainable management and perfect use of water make soil sustainability			9
Without good soil the farming is impossible			10
Soil reinforcement is a special activity and need high knowledge and experience			11
Soil test has a basic role in soil management and Improvement			12
Planting some plants such as alfalfa is the reason of soil productivity			13
I emphasize on others guidance and instructions in related to soil sustainability protection			14
I'm enthusiastic to maintain the farms			15
Soil erosion is a serious problem that unsuitable soil management is the reason of this problem			16
It's a duty to respect next generation to Have proper soil			17
Farmers have to been obligate to use sustainable soil techniques			18
Farmers know everything about sustainability soil management and they don't need to any education			19
Profit maximization is more important than soil sustainability			20
Agricultural specialists must educated farmers to know what's sustainability soil management			21
I encourage the other farmers to use sustainable soil management			22

TABLE 6
The correlation relationship between the variables for respondents' viewpoint

First variable	r	P
Participate in educational durations	*0.212	0.04
Level of education	*0.186	0.017
The level of media usage	*0.147	0.028
Level of beneficiaries' income	**0.241	0.004
The number of family members	- **0.384	0.002
Distances until Agricultural service center	*-0.241	0.009
Efficiency of main production	**0.536	0.000
Number of beneficiaries' contacts with change agents	0.097	0.095
Number of beneficiaries' contacts with state institutions	0.101	0.075
Type of beneficiaries' job	*0.125	0.047
Type of beneficiaries' job	**0.361	0.001
Level of interest to agricultural activities	**0.220	0.004
Social altitude of beneficiaries	**0.282	0.003
Cultural trait of beneficiaries	**0.257	0.001
The level of farmers knowledge about sustainable development	*0.199	0.012
drove number	*-0.143	0.042
Attitude of beneficiaries to sustainable soil development	**0.312	0.002
The level of extension services presentation to beneficiaries	*0.112	0.042
The amount of loans	**0.124	0.034
The watery farms area	**0.236	0.007

confidence and level of beneficiaries' income. Meanwhile, the number of family members, efficiency of main production, level of experience in farming, level of interest to agricultural activities, social altitude of beneficiaries, cultural trait of beneficiaries, attitude of beneficiaries to sustainable soil development, the amount of loans and the watery farms area were found to have significant relationships with 99% confidence and technical knowledge of beneficiaries about sustainable soil management.

TABLE 7
The role of independent variables in sustainable soil management

Regression model	R	R^2	Adj R^2	S.E
Stepwise	o.792	0.737	0.684	0.241

Regression model was also significant (sig=0.000). The regression analysis showed the variables that were statistically significant. The results indicated that 68% (R^2_{adj}=0.68) of the variance in the technical knowledge of beneficiaries about soil management could be explained by these variables.

TABLE 8
The result of multiple regressions (stepwise method) to determine the role of independent variables in technical knowledge of beneficiaries about sustainable soil management

Independent variables	B	Beta	T	sig
Constant	3.097	---	3.376	0.000
Efficiency of main production	0.674	0.638	8.364	0.000
Economical situation	0.468	0.389	5.975	0.000
Social situation	0.339	0.307	4.579	0.002
Individual factors	0.309	0.293	3.098	0.003
Extension factors	0.218	0.177	2.429	0.014

The regression equation can be written using the information presented in Table 11, as follows:

Y= Efficiency of production (0.638) + economical situation (0.389) + social situation (0.307) + individual factors (0.293) + extension factors (0.177)

- There is significant and positive relation between educational level of farmers and their knowledge on sustainable soil management, whereas more than 52% of the farmers have educational level that is lower than guidance school, leading to their low knowledge of sustainable soil management. This finding agrees with the finding by several researchers including Touri (2009), Dinpanah (2004), Karbasi (2001), Jahani (2001), Bagdi (2005), and Najouki (2003).
- There is a significant and negative relation between the number of family members and their knowledge about sustainable soil management. The higher the number of the family members, there is more pressure on the farms to have further income. Some researchers like Shahroodi and Chizari (2005), Touri (2009), Bagdi (2005) have reported the same result.
- There is a significant and positive relationship between efficiency of main production and their knowledge about sustainable soil management. The latter is evident because with increasing farmers' knowledge, they will use the references to the optimum and consciously. Some researchers like Dinpanah (2004), Hayati *et al*. (2000), Shahroodi and Chizari (2005), and Touri (2009) have also reported the same finding.
- There is a significant and negative relationship between distance of farms to service centre and the farmers' knowledge about sustainable soil management. The same result has also been highlighted by some other researchers like Dinpanah (2004), Shahroodi and Chizari (2005), Hayati *et al*. (2000), whereas no relationship between the two was reported in Touri's (2009) research.

- There is a significant and positive relationship between farmers' experience in agricultural activities and their knowledge about sustainable soil management. The same result was also reported by some other researchers like Dinpanah (2004), Shahroodi and Chizari (2005), Nooripur and Shahvali (2006), Tabraeei (2005), and Najooki *et al*. (2008).
- There is no relationship found between the number of beneficiaries' contacts with change agents and the number of beneficiaries' contacts with state institutions with sustainable soil management. However, some researchers like Dinpanah (2004) and Touri (2009) reported a positive relationship for the two variables.
- There is a significant and positive relationship between farmer's altitude and their knowledge about sustainable soil management. This result was not expected because social altitude is a synthetic variable that is relevant to people's knowledge and information related to their job and life. Some studies have also reported the same finding (see Dinpanah, 2004; Tabraei, 2005).
- There is a significant and positive relation between the amount of loans and farmers' knowledge about sustainable soil management. This confirms the work of Dinpanah (2004) and Bagdi (2005).

CONCLUSION

In order to carry out the regression analysis, the most important factor in the educational level of farmers in relation to sustainable soil management in Garmsar is the efficiency of the main production. As a result, suitable orientation is needed to introduce some techniques that could improve and enhance the productions. An example of this technique is enhancement of farmers' technical knowledge about sustainable soil management (nutrition management of productions, shortage signs, etc.).

Farmers' knowledge about sustainable soil management is still low. Hence, improving the capacity building of farmers to educational classes and educational durations attend to adult education principles and different level of knowledge, attitudes and skills.

The descriptive statistics shows that farmers' participation in extension programmes is still low. Therefore, educational centres must find ways to increase farmers' willingness to partake in educational classes and provide schedules and duration of programmes that are suitable and relevant to farmers' needs.

As indicated previously, farmers' educational level has a significant role in sustainable soil management and it is necessary to farmers' literacy to regulate and execute comprehensive programmes.

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