Adoption of Sustainable Soil Management by Farmers in Iran

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ABSTRACT

Farmers in the Garmsar Township of Semnan Province in Iran were surveyed in order to explore their perception about the factors influencing the adoption of sustainable soil management. The total population for this study was 8875 farmers in the Garmsar Township and 192 respondents were selected through random sampling. The data was analyzed by using factor analysis technique. Based on the perception of the respondents and factor analysis, factors were categorized into four groups: education, economic, farming and policy making factors. These factors were then ordered by the magnitude of their impact.

Key words: Soil Management, Sustainable, Factors, Adoption, Iran.

Introduction

Soaring population growth on one hand and excessive pressure on land and inappropriate and incorrect operation of the soil on the other hand, caused great losses to the soil. Based on the report by FAO [3] more than one third of lands in the world have been subject to soil erosion. It has been reported that 5 to 7 million hectares of arable agricultural land have been destroyed due to lack of proper management, use of improper methods of farming, grazing and excessive erosion.

Iran is no exception and based on the statistics by Ministry of Agriculture of Iran, the rate of destruction of soil compared with world and Asia average is much higher and it is estimated to be 60 percent.

Soil erosion can be one of the most important environmental issues and in the process of agricultural production; about 75 billion tons of fertile are being damaged because of soil erosion.

Soil erosion in different ways prevents the development of agriculture sector to take place, depriving resource poor farmers from better income, increasing sediments in waterways and causing yield losses in irrigated lands.

In order to move toward sustainable agricultural and preservation of quality and quantity of soil, conservation measures are necessary to provide grounds for increasing production and eventually controlling the migration of rural population.

Therefore, improved soil management by farmers can be effective in improving productivity, increasing quality and quantity of food self-sufficiency, reducing poverty levels, providing food security and stabilizing the sustainability of agriculture [5].

Principles of proper management and appropriate utilization of soil would reduce the crisis in soil erosion [5]. World Bank, [10] reported that sustainable soil management is the ability to protect and maintain pasture production, comprehensive protection of watershed in order to save water and control soil erosion.

In order to achieve sustainable management of soil resources, two strategies are recommended: restoration of soils and degraded ecosystems and consistent application of agricultural technologies and improve them.

Araya and Asafu-Adjaye [1] concluded that...
knowledge of farmers, extension programs about soil conservation, programs that increase the income of farmers and soil conservation research that can directly bring benefits the farmers would influence the adoption of soil protection measures. Napier and Tucker, [8] concluded that the most important social and economic factors influencing adoption of soil conservation practices include; access to subsidized programs, to technical assistance and to information sources of educational programs.

Calatrava-Leyva et al [2] concluded that access to agricultural machinery and to subsidies, age of farmer, and place of birth, main source of income and the use of extension services would influence the adoption of soil conservation practices.

Kessler, [6] concluded that agricultural income, guaranteed price for agricultural products, access to agricultural lands, income from non agricultural activities, and knowledge about the importance of natural resources, participation and average age of households had impact on investment of farmers on soil protection measures.

Njuki and others [9] in a research in three African countries investigated the role of social capital on adoption of soil management technologies. The results of the study show that membership in farmers association, participation in social activities, trust among people, cooperation among people and factors such as age, gender, amount of land have influenced farmers to adopt sustainable soil management technologies.

Iran in terms of soil erosion among regional countries is ranked first and in the world ranked second. The average annual erosion rate in rain fed areas reached 100 tons ha which is 77 times more than the world average [4].

In the city of Garmshap inappropriate use of chemical fertilizers and lack of sustainable management resulted in severe destruction and low productivity of agricultural soils. So that even many farming lands close to population centers lack necessary productivity in production of agricultural products.

The purpose of this study is twofold. First, it determines the key factors that influence and affect the adoption of sustainable soil management by farmers in Semnan Province, Iran. Secondly, it provides suggestions for policy recommendations.

**MATERIALS AND METHODS**

The methodology used in this study involved a three stage combination of descriptive and quantitative research. Stage one involved a series of in-depth interviews were conducted with senior experts in the department of agriculture in Garmshap Township and faculty members of Agriculture College in Garmshap branch, Islamic Azad University to provide a context. A questionnaire was developed based on these interviews and relevant literature. The questionnaire included fixed-choice questions. A five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used as a quantitative measure.

The final questionnaire was divided into several sections. The first section was designed to gather information about personal characteristics of respondents. The second section was designed to measure the attitudes of farmers about the factors that influence the adoption of sustainable soil management. The respondents were asked to indicate their agreements with statements by marking their response on a five point Likert-type scale. The variables and their measurement scale are presented in Table 1.

Content and face validity were established by a panel of experts consisting of faculty members at Garmshap Branch, Islamic Azad University, and some experts in the Department of Agriculture in Garmshap Township. Minor wording and structuring of the instrument were made based on the recommendation of the panel of experts.

Stage two involved a pilot study with 3o farmers in the Garmshap Township who had not been interviewed before the earlier exercise of determining the reliability of the questionnaire for the study. Computed Cronbach’s alpha score was 91.0%, which indicated that the questionnaire was highly reliable.

Stage three involved a survey held in summer 2010. The research population included all farmers in the Garmshap Township (N=8875). By multi-stage cluster sampling technique, 192 were selected by using Cochran Formula. The data collected by interviewing the respondents and analyzed by using ordinal factor analysis technique.

**Results and discussion**

Table 2 summarizes the demographic profile of respondents. The results of descriptive statistics indicated that mean age of respondents was more than 49 years old. The results also show that mean of working experience was 21.8 years.

The classification of the factors into four latent variables was displayed in table 3. The variables were classified in economic, education, farming and policymaking factors. KMO and Bartlet test were used to show the extent variables have correlation and dependence to each other. In factorial analysis when KMO is less than 0.5, data are not suitable for factorial analysis and when KMO is between 0.5-0.7, data are suitable for factorial analysis. KMO amount and meaningful level of Bartlet test indicated in Table 4, that shows are very suitable for factorial analysis.
Table 1: Variables and their measurement scale

<table>
<thead>
<tr>
<th>Variables</th>
<th>Measurement Scale</th>
</tr>
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<tbody>
<tr>
<td>Attitudes about Economic Factors</td>
<td>Five-point Likert</td>
</tr>
<tr>
<td>Attitudes about Farming Factors</td>
<td>Five-point Likert</td>
</tr>
<tr>
<td>Attitudes about Policy Making Factors</td>
<td>Five-point Likert</td>
</tr>
<tr>
<td>Attitudes about Education/Extension Factors</td>
<td>Five-point Likert</td>
</tr>
</tbody>
</table>

Table 2: Personal Characteristics of Respondents

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Farming land/ha</td>
<td>Mean= 5.96</td>
</tr>
<tr>
<td>Age/year</td>
<td>Mean=49.14</td>
</tr>
<tr>
<td>Work Experience/Year</td>
<td>Mean=21.8</td>
</tr>
</tbody>
</table>

Table 3: Classification of factors by using Ordinal Factor Analysis

<table>
<thead>
<tr>
<th>Factor Name</th>
<th>Variance by Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education/Extension</td>
<td>27.75%</td>
</tr>
<tr>
<td>Economic</td>
<td>21.31%</td>
</tr>
<tr>
<td>Farming</td>
<td>17.49%</td>
</tr>
<tr>
<td>Policy making</td>
<td>11.84%</td>
</tr>
<tr>
<td>Total</td>
<td>78.39%</td>
</tr>
</tbody>
</table>

Table 4: KMO amount and meaningful level of Bartlet test

<table>
<thead>
<tr>
<th>Factorial Analysis</th>
<th>KMO</th>
<th>Bartlet Test</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factors influencing the adoption of sustainable soil management</td>
<td>0.876</td>
<td>7983.961</td>
<td>0.00</td>
</tr>
</tbody>
</table>

The results show that these factors contributed about 78.39 percent of variance in the perception of respondents about factors influencing the adoption of sustainable soil management. Table 3 represents components of each factor, as well as, portion of each factor from the total common variance. As one may observe, about 78% of total common variance is explained by these four factors, where the majority of it has been explained by the education factor.

Discussion and conclusion

The adoption of sustainable soil management by farmers could be achieved over time. Therefore, certain special factors should be identified and need to be carefully examined.

As shown in the factorial analysis, the factors were categorized in four groups: education, economic, farming and policy making factors. These factors were then ordered by the magnitude of their impact.

Based on the perception of respondents, the most important factors influencing the adoption of sustainable soil management was education factor. The result is in accordance with findings of Araya and Asafu-Adjaye, [1].

The results of the study also show that the economic factors could influence the adoption of the sustainable soil management. The research by Calatrava and others [2], Napier and Tucker, [8] and Mwakubo and others, [7] confirmed this finding.

The policy making factors was also found to be an important factor which would influence the adoption of sustainable soil management by farmers. This is in accordance with results of studies by Kessler, [6] and Calatrava and others, [2].

Overall, these findings suggest that extension/education is the most important factor which influences the adoption of sustainable soil management by farmers.

The results also show that more awareness and knowledge about the importance of sustainable soil management is widely needed by the people most likely benefit it. In this regard, extension and education classes and packages could inform farmers about the benefits and ways to control the soil erosion.

References


