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## **ANALYSIS OF SUSTAINABILITY OF CANOLA PRODUCTION IN QAZVIN PROVINCE**

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### **ABSTRACT**

Excessive use of production inputs in order to increase output during the recent decades and the resulting environmental degradation have doubled importance of sustainable production and preservation of natural resources. In this context, this study analyzes sustainability of canola production in Qazvin Province. The research dominant procedure was surveying and required data were collected by multistage classified sampling method, in agricultural season of 2013-14, from 242 canola growers in the villages of Qazvin province and then analyzed. The results show that sustainability level is negative from the view point of 2.5% of the canola growers, relatively negative from the view point of 44.20% of the canola growers, good from the view point of 53% of the canola growers and excellent from the view point of 0.3% of the canola growers. Also path analysis shows that the results of analysis, regarding identification and prioritization of production sustainability indicated that economic, social, agricultural, policy-making, and educational factors have had the greatest impact. In this regard, decrease in the number of dealers (mediators) by purchase of canola product among components of economic factor, favorable conditions for participation of canola growers in decision-making and planning towards production sustainability among components of social factor, pest and diseases control by planting resistant varieties among components of agricultural factor, establishment and development of production infrastructures for high quality production of canola among components of policy-making factor, providing movie and documentaries about practical training of use of natural inputs among components of educational factor have been assumed at the first priority of importance.

**Keywords:** Sustainable Production, Canola, Economic, Social and Environmental Indices, Path Analysis

### **INTRODUCTION**

Sustainable production is an important branch in sustainable development of agriculture that has been known as an appropriate approach in the 21<sup>st</sup> century towards sustainability of production sector and the bulk of people living in third world (Cotula, 2009). In spite of the efforts made by developing countries in this sector, despite scientific and practical studies that have been conducted, agricultural sector is still unable to obtain the necessary sustainability in economy and production. The main reason is rooted in attitudes to the concept of system of production sustainability in these countries (Alenda, 2008).

In this regard, studies show that attitude to the system of production sustainability has mainly technical and environmental dimensions and more attention has been paid to the physical dimension. If the relationship between man and nature, and then production are considered, this approach has two dimensions i.e. economic and social aspects that are put next to the environmental dimension and effect of each dimension on each other creates a whole that is proposed as sustainable system of production. On this basis, achievement of sustainability goals in the production system is essential from both quantitative and qualitative aspects (Benton, 2012).

Among agricultural products in Iran, oilseeds production has enjoyed a special place in development programs because due to its over-consumption in the country, necessity of investment in their production

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is undeniable. This claim is proved by 16 kg per capita consumption of edible oil in Iran that considering the country population, about one million ton of oil is consumed (Bayala, 2014). This is despite the fact that over 90% of oil consumption is met through imports and results to a cost over 1.2 billion dollars and if current trends of consumption and population growth continue, two billion dollars within a few years will be spent annually on the import of edible oil. Despite a long history of oilseeds cultivation in the country, for various reasons there are problems for production of vegetable oil and canola (Bellarby, 2013). However, A- specific location of Qazvin Province, B- proximity to major markets of the products and proximity to industrial centers of the country, C- access to experts in the field of canola cultivation, D- access to transit ways for transporting produced goods, E- long history of agricultural industry in the province, have made development and production of canola as one of the relative merits of the province so that in the current year (2012) the area under cultivation of this crop reached to 4693 hectares and covered over 7% of total production of the country. The most important reason of choosing this product by Qazvin farmers is that canola production happens along with other grains, and on the other hand, this product has appropriate competitive capacity to increase the income of farmers compared to other products (Conroy, 2003). But in recent years, especially since the implementation of *Increase in Canola Production Plan* since 2002 up to now, we have been witness of fluctuations in the production of this crop throughout Qazvin province and necessity of review and design of a suitable model for the production of canola in a stable system is more intuitive than ever (Byrne, 2001).

In this regard, according to the policy of increasing canola production in Qazvin province and multi-faceted and complex nature of sustainability, in this research all economic aspects (reducing production risks, reduction of production costs, governmental support for high quality production, etc.), social aspects (providing food security, promotion of public participation, decrease in unemployment rates, equity and equality, quality of life, etc.) and agricultural aspects (lack of degradation of production resources including water and soil, decrease in soil erosion, decrease in water resources of the province, etc.) have been taken into consideration in relation to canola production. Therefore, the purpose of this research is to design model of sustainable system of canola production in Qazvin province (Piorr, 2003).

- Anthony (2013) in an article entitled *Feasibility Study of Economic Sustainability in Production of Oilseeds in North Carolina using NPV method (Assessment of Revenue and Interest)* concluded that failure to set prices for production and sales and lack of governmental support policies in regard to subsidies are considered as important factors of decrease in production of the oilseeds in North Carolina and reports of FAO and the Organization of Economic Cooperation Development on agricultural outlook of 2013-2022 state that change in economic growth policies, paying attention to demand and supply of food in proportion to consumer needs, increase in agricultural production on a limited scale and high productivity growth, can be of the most important factors from 2013 to 2022. Yousefi (2012) in a paper entitled “*Use of Canola to Produce Required Foods*” concluded that vegetable edible oil is a staple food of human beings that is available almost in all houses. Due to its high quality oil, canola has the utmost importance. Among oilseeds, canola has a high ecological flexibility and can be planted twice (in spring and fall) a year. However, due to the summer heat, drought and weeds in spring and summer, it is preferred to be cultivated in the fall. Emadzadeh et al., (2013) in a study entitled “*Relative Advantages of Irrigated Production of Canola in Chahar Mahal and Bakhtiari Province*” concluded that mismanagement in production and lack of governmental support for the timely payment of subsidies caused production of this crop to decrease.

## MATERIALS AND METHODS

### Methodology

The present study is a quantitative research in terms of the subject nature and a practical research in terms of purpose, because it seeks to develop practical knowledge in a particular field. Its results are useful for canola growers, experts, researchers, planners and policy makers in agricultural issues. In terms of variables control, this research is of descriptive and correlation type that is conducted by survey. Statistical society of this research is composed of all canola growers of Qazvin province who cultivated

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canola in 2012-13. These people were 918 persons according to statistics of Agricultural Jihad Organization of Qazvin province that 242 cases were selected based on the Cochran formula.

## **RESULTS AND DISCUSSION**

### **Results**

Based on the results of the questionnaire in this study:

The mean age of the studied cases was about 44.5 years. The results of consideration of education level of the cases show that 28% of them did not have high school diploma, 47% of them had high school diploma, 11% of them had associate's degree, and 14% of them had bachelor's degree and upper. 69 percent of the farmers had a history of agricultural activity over 5 years. 64 percent of the farmers had a history of canola production less than 5 years.

The average land area was 3.5 hectares and the land areas varied from 5 hectares to less than 5 hectares. 61% of the canola growers were engaged in other activities.

36% of them were practicing in animal husbandry besides canola, 5% of them were practicing in agriculture and 59% of them were involved in other activities beside canola cultivation.

The average annual income of the study population was 3 million Rials. Their minimum and maximum income was respectively more than 30 million Rials and 20-30 million Rials. Some of the farmers obtained their annual income (5 and less than 5 million) from other activities than canola cultivation.

### **Correlation between the Research Variables**

Pearson's correlation coefficient was used in order to investigate the relationship between economic factors and dimensions of sustainable production of canola. These results indicate there is significant positive correlation between the three economic, social and environmental dimensions with economic factors. There is a significant correlation between economic factors and achievement of environmental, social and economic dimensions with 99% confidence. In all three cases, the correlation is positive. The correlation between the economic factor and achievement of environmental dimension is 0.265 and the correlation between economic factors and achievement of socio-economic dimensions respectively equals 0.298 and 0.250.

The correlations between the factors and dimensions were analyzed by sig value, i.e. probability value. If this value is less than 0.05, correlation between that factor and dimension is at confidence level of 95%. Otherwise, there is no correlation.

Given the above mentioned, the probability of achieving sustainability of production with the environmental factor is smaller than 0.05. Therefore, at confidence level of 99%, there is significant correlation between environmental factors and achievement of sustainability of production. This correlation is positive (direct) and its value is 0.189. According to the above probability table, there is a significant correlation between social factors and achievement of sustainability of production at confidence level of 99%. This correlation is positive. The results of this correlation coefficient indicate that there is significant positive relationship between two social and environmental dimensions and social factors.

Pearson's correlation coefficient was used to investigate the relationship between policy making factors and dimensions of sustainable production of canola. The results of this correlation coefficient indicate a significant positive relationship between the three economic, social and environmental dimensions and policy making factors. Considering probability value of the above table, there is a significant correlation between educational factor and access to sustainable production, between the educational factor and access to environmental dimensions, at 99% confidence level. In both cases the correlation is positive. Correlation coefficient of educational factor and achieving sustainable production is 0.222 and correlation coefficient between educational factor and achieving the environmental dimensions is 0.141.

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**Table 1: Correlation between the dimensions of sustainability of canola independent variables-**

		<b>Educational factor</b>	<b>Policy making factor</b>	<b>Agricultural factor</b>	<b>Social factors</b>	<b>Economic factors</b>
Environmental	R	0.464	0.467	0.452	0.324	0.265
	sig	0.00	0.00	0.00	0.00	0.00
Economic	R	0.381	0.432	0.383	0.00	0.250
	sig	0.00	0.00	0.00	0.96	0.00
Social	R	0.417	0.396	0.389	0.441	0.228
	sig	0.00	0.00	0.00	0.00	0.00

*Source: the research findings*

Path analysis is a statistical method of application of standard Beta coefficients of multi-variable regression in the structural models.

Path analysis suggests that which way is more important or more significant. Path coefficients are calculated based on standardized coefficient of regression. A variable is assumed to be a function of other variables and its regression model is drawn.

The figure shows the research path analysis based on the assumptions discussed in estimation of standard coefficients.

**Table 2: Results of the path analysis model**

<b>Response variable</b>	<b>factor</b>	<b>Non-standardized coefficients</b>	<b>standardized coefficients</b>	<b>T-statistics</b>	<b>Significance level</b>	<b>Results</b>
Sustainable production	Agricultural factor	0.0228	0.209	6.789	<0.001	Significant
	Economic factors	0.314	0.296	13.205	<0.001	Significant
	Social factors	0.287	0.203	6.565	<0.001	Significant
	Policy making factor	0.469	0.51	16.543	<0.001	Significant
	Educational factor	0.71	0.651	21.088	<0.001	Significant

*Source: the research findings*

Based on the results of factorial analysis of the assessment range, economic factors were prioritized at high level. As well as reducing number of mediators through purchase of canola by cooperative companies, insuring the products, international market access for exports of canola, insuring marketing steps (transportation and warehousing) and development of industry of processing healthy foods from canola in order to increase added value, had the highest priority and guaranteed purchase of canola by cooperative companies and determination and provision of appropriate subsidies for preparing inputs and tools necessary for the sustainability of canola production had the lowest priority. Assessment range of social factors was considered very effective. Moreover, the item “good conditions for participation of canola growers in decision-making and planning towards sustainability of production and culture promotion and advertising for canola consumption” were given the highest priority and participation of private sector in order to use its facilities and capabilities and establishment of cooperative enterprises in adoption and implementation of sustainable production towards sustainability of production were

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considered the lowest priority. Assessment range of agricultural factors has been considered appropriate and the item “pests and diseases control by cultivation of resistant varieties” was given the highest priority and improvement of quality of factors such as water, soil or seed was considered the lowest priority.

Assessment range of policy making factors has been considered appropriate. And as well the item “establishment and development of production infrastructure for high quality canola” was considered the highest priority and “setting standards and regulations for chemical pesticides and creation and development of production infrastructure for production of high quality canola” was considered the lowest priority. Assessment range of educational factors was evaluated in the appropriate range. As well “producing movies and documentaries about practical training on the use of natural inputs” was placed as the highest priority. Communication of research centers with canola growers to use indigenous knowledge in order to determine environmentally compatible methods was at the lowest priority. Assessment of environmental aspects was evaluated in the moderate range. Among environmental items and dimension, taking soil and water quality into consideration was given the highest priority and more attention to the use of organic fertilizers and health and nutrition of consumers had the lowest priority. Assessment range of economic dimension was evaluated in an appropriate range. Among economic items and dimension, usefulness of production and maintenance or establishment of a permanent income for producers had the highest priority and attention to food security of producer and consumer was given the lowest priority. Assessment range of the social dimension was evaluated in the appropriate range. Among social items and dimension, attention to the improved well-being and quality of life of canola growers was given the highest priority and helping to set up trade unions of canola growers was given the lowest priority.

### **Discussion and Conclusion Conclusion**

- Considering that economic factors in general, and reduction of mediator by buying the product of canola by cooperatives, insuring the product, international market access for exports of canola, insuring marketing stages (transportation and warehousing) and development of industry of processing healthy foods from canola in order to increase added value in particular, play important role in the sustainability of production, government measures to improve marketing and product purchase are necessary.
- Given that social factors in general and appropriate conditions for participation of canola growers in decision-making and planning for the sustainability of production and culture promotion and advertising for canola consumption in particular show great impact on the sustainability of production, therefore culture promotion for participation of farmers is recommended.
- Since agricultural factor in general and pests and diseases control by cultivation of resistant varieties in particular have a huge impact on the sustainability of production, measures like holding training courses for optimum use of natural resources and providing new ways to enhance the quality of the product are necessary.
- Given that policy making factor in general, and establishment and development of production infrastructure for high quality canola in particular have a huge impact on the sustainability of canola production from producers' view point, considering the current situation of the country in terms of benefiting from this divine gift, the government is recommended to take measures to change attitudes of policy makers from quantitative sustainability of production to qualitative sustainability of production.
- With regard to the fact that educational factor in general and producing movies and documentaries about practical training on the use of natural inputs, establishment of an efficient system of giving canola growers information, visit of distinguished canola farms in particular, make a great impact on sustainability of production from farmers' viewpoint, therefore it is recommended to hold training courses to introduce producers and benefit and advantages to promoters and promotion of new methods on the other hand.

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