

Assessing Various Aspects of Sustainability in Wheat and Pistachio Agro-ecosystems of Kerman Province

M. Naghizadeh¹ and R. Moradi^{*}

Submitted: 18-07-2015

Accepted: 06-12-2015

Naghizadeh, M., and Moradi, R. 2018. Assessing various aspects of sustainability in wheat and pistachio agro-ecosystems of Kerman province. *Journal of Agroecology* 9(4): 993-1006.

Introduction

Agricultural sustainability is the ability of an agro-ecosystem to either maintain or to implement the productive characteristics and taking into consideration both the ecological-environmental and socio-economic aspects. Sustainable agriculture implies long term maintenance of natural systems, optimal production with minimum input, adequate income per farming unit, fulfillment of basic food needs, and provision for the demands and necessities of rural families and communities. All definitions of sustainable agriculture promote environmental, economic and social harmony in an effort to attain the meaning of sustainability. The purpose of this study was to develop a sustainability index for quantifying the different aspects of sustainability as economical, social, agronomical and management for wheat and pistachio production systems which are dominant systems in Kerman province.

Materials and Methods

In the present study all aspects of agricultural sustainability including ecological, social and economic was selected. Accordingly, the sustainability index, a set of 82 indicators for wheat and pistachio crops were designed, to collect data through questionnaires and then analyze it. Sustainability indices include socio-economic indices, fertilizer and chemicals, crops and livestock production, crop residue management, irrigation water, diversity of agricultural systems, mechanization, tillage and weed management in the main cultivation area in 2014 and 2015 were analyzed. Sustainability index was calculated using the weighting sum. Therefore the rate of contribution for each specific indicator in the final index and rating of all indicators were done from zero to its maximum rated indicators with regard to the most unfavorable situation to the most favorable indicators. After scoring each measure, the total scores of indicators is accumulated and was introduced as the final score. After designing the indicators, 295 and 234 questionnaires were completed for wheat and pistachio, respectively. Farms were selected randomly. Data were analyzed using Excel and SAS software.

Results and Discussion

The Study of individual characteristics of farmers showed that the average age of farmers for wheat and pistachios production systems was about 43 and 39 years respectively. Age was considered as an important factor in displaying the features of one's personality. Therefore, young group is more zealous and earnest in their work and can handle farming activities more efficiency. In both studied systems, those who had high school education had the highest frequency. Education may enhance farm productivity directly by improving the quality of labor, increasing the ability to adjust to disequilibria, and through its effect upon the propensity to adopt innovation successfully. Average yield was reported 3460 kg ha⁻¹ for wheat and 573 kg ha⁻¹ for pistachios. Crop production is an indicator of system efficiency, in regard to genetic potential, ecological conditions, management, capital investment and labor use. The results showed that, unfortunately, the fertilizer and chemical inputs, especially in pistachio, is extremely high, which is inconsistent with the approaches of sustainable agriculture. The average annual income in wheat and pistachio was gained 4 and 18 million tooman, respectively. Non-agricultural income sources make sure to provide sufficient income to the farmers. Reduction

1- Assistance Professor, Department of Plant Productions, Agricultural Faculty of Bardsir, Shahid Bahonar University of Kerman, Iran.

(*- Corresponding author Email: r.moradi@uk.ac.ir)

DOI:10.22067/JAG.V9I4.48500

in rural incomes will lead to different immigration outcomes. Family economic security directly affects on the economic sustainability of agriculture. Assessing various sustainability indicators showed that the sustainability index in wheat and pistachio was 47.2 and 44.2, respectively, and also that these agro-ecosystems are not sustainable. Crop residue management indicator in wheat and socio-economic in pistachios production systems had a better condition than other indicators. The results indicated that chemical inputs, irrigation water and the lack of economic stability for farmers, are the main problems in the field of sustainability and to achieve the stability in wheat and pistachio agro-ecosystems, various aspects of economic, social, agronomic and management should be reviewed and revised.

Conclusion

In generally, to increase the sustainability of the wheat and pistachio agro-ecosystems, the following strategies are suggested: The sprinkler irrigation method must be developed and use of urea fertilizer and pesticide should be decreased. The best managements of chemical fertilizers and pesticides, social- individual characteristics of farmers, crop production and crop residual management can cause the sustainability.

Keywords: Index, Income, Indicator, Management, Socio- economic

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