



Tropentag, September 20-22, 2017, Bonn

“Future Agriculture:
Socio-ecological transitions and bio-cultural shifts”

Monitoring Sustainability of Saffron and Canola Production Systems in Maragheh, Northwestern Iran

ARASH MOHAMMADZADEH¹, JAVAD VAFABAKHSH², ABDOLMAJID MAHDAVI DAMGHANI¹, REZA DEIHIMFARD¹, HOUMAN LIAGHATI¹, FATEME AGHAMIR¹

¹*University of Shahid Beheshti, Environmental Sciences Research Institute, Iran*

²*Ministry of Agriculture Jihad, Iran*

Abstract

Diminishing environmental quality and rendering natural resources are increasingly pushing agroecosystems toward more sustainable and environmental-oriented approaches for crop production. Saffron is a valuable and economically strategic crop in Iran with an 80 % of world total production in the country. Canola is one of the most important oilseed crops in Iran regarding its good yield potential in the country and great dependence of Iran to import oilseeds. In the present study, sustainability of saffron and canola production systems was evaluated using quantitative indices including energy efficiency, global warming potential (GWP), economic indicators, pesticide risk (field environmental impact quotient - FEIQ), fertiliser, labour and water use efficiency. Data were collected by face to face interviews with all growers of saffron and canola (25 for saffron and 30 for canola) in the Maragheh Plain, northwestern Iran and 15 experts of the Ministry of Agri-Jihad in the study area. Results showed that canola production was more energy-intensive than saffron production. The share of the non-renewable energy of total energy used in the canola production system (83.7 %) was higher than the renewable energy used (16.3 %), but the share of renewable energy in the saffron production system (54.6 %) was greater than the non-renewable form (45.4 %). The GWP of the GHG emissions for canola was estimated being higher than for saffron (1671.2 vs. 646.2 kg CO₂eq ha⁻¹). The eco-efficiency based on GWP was 1.54 and 8.66 USD kg⁻¹ CO₂ eq for canola and saffron, respectively. The FEIQ value was 63.1 ha⁻¹ for saffron and 68.9 ha⁻¹ for canola. Results revealed that water and nutrient economic productivities were higher in saffron than canola. In terms of economic labour productivity, however, the canola production system was more efficient. It can be concluded that saffron production system was more sustainable than canola-based agroecosystems.

Keywords: Energy efficiency, global warming, nutrient use efficiency, pesticide