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Title

Sustainability evaluation of garlic, onion and wheat production systems of Sistan by joint use of energy, emergy and economic accounting

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Abstract

Sistan is one of the largest wheat producing area in Iran, but wheat production has given way to the production of wheat during the past years. To analysis the reason behind this conversion the productivity and sustainability of wheat, onion and garlic systems was examined using emergy and economy evaluation in 2019. In order to research site to have similar conditions, the data required for this study were collected in two villages of Karim Koshteh and Safarzaei, Zabol.Total emergy supporting the systems was estimated to 2.45E+16, 3.12E+16 and 4.73E+16sej/ha for the wheat, onion and garlic production systems, respectively. The purchased resource accounts for 55.9, 53.4 and 65.4 percent of total emergy flow for the wheat, onion and garlic production, respectively. This shows that the studied both systems are an extremely open system influenced strongly by the input from purchased inputs. The composition of emergy input to these production systems largely wasdifferent. The emergy yield ratio was 1.27, 1.15 and 1.90 for wheat, onion and garlic production, respectively. The values are low, indicating that the many process of the two systems converts natural resources from local into product. The environmental loading ratio of garlic systems was, a little bit higher than the wheat and onion systems, and correspondingly the sustainable index is lower than that of wheat and onion. Economic analysis indicated that output/input ratio and the benefit of the garlic production were greater than that of wheat and onion. As a general outcome, these analyses showed that the better the environmental performance of the system, the worse its economic performance.

Keywords: Environmental sustainability, Organic fertilizer, Natural resources, Soil loss, System analysis