



University of Zabol

School of Agriculture

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Thesis for Master's degree Agrotechnology

**Emergy evaluation and economic performance of cereal
cropping systems in Zahak county**

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Abstract:

Cereals are one of the first plants to be cultivated by humans and for this reason they are one of the most important crops. The main challenge in relation to conventional agriculture is the high consumption of non-renewable energy. Consumable chemicals, machinery, fossil fuels and electricity are among the most important inputs that are widely used in the production process of various agricultural products. In this regard, the present study was conducted to investigate the stability of grain production systems in Zahak city using energy analysis method. This study was conducted using information related to grain production systems in the crop year 2019-2020 in Zahak city. Data collection was done using Jihad Keshavarzi database and Iranian agricultural statistics. To calculate the energy indices, all inputs are considered as four groups of renewable environmental inputs (R), environmental inputs that are potentially renewable, but due to the long time in their renewal as non-renewable environmental inputs (NO), Renewable market inputs (FR) and non-renewable market inputs (FN) were divided. All calculations related to determining the amount of energy and its indicators were performed by Excel software. To calculate the solar energy of inputs and outputs in wheat, barley, corn and millet production systems after determining the most important inputs and outputs, first their raw amount in terms of mass unit (grams) or energy unit (joules) per hectare per year is determined. The results showed that of the total support of wheat and barley production systems to wheat production system had the highest amount of non-renewable environmental inputs and in the barley system purchased inputs with 47.37% had the highest input. Examination of energy indices showed that the conversion factor (Tr) in the wheat system was lower than the barley system, but the biological conversion factor of the wheat system was higher than the barley system. Examination of special economic performance calculated in wheat and barley production systems showed that in both economic performance and biological performance of barley system was at a more desirable level than wheat system, which indicates the higher efficiency of this system than wheat system. The study of the percentage of R index also showed that the value of this index is higher in the wheat system, which indicates the higher stability of the wheat system than the barley system in Zahak city, which can be attributed to the wheat system using more renewable inputs. The study of the EYR index showed that the wheat system had a higher rate of EYR than the barley system, which could also be due to the high share of this system in the total non-renewable inputs. The results of the EIR index showed that the wheat production system had a lower value than the barley system, which can be attributed to their greater use of renewable environmental resources. The study of environmental load index showed that both systems have a higher value than the ELR standard and the wheat system puts more pressure on the environment than the barley system, higher application of chemical fertilizers such as nitrogen in the wheat system. Also, free environmental inputs can be considered as the reason for the high ELR value in the wheat system. The ESI index value in both systems was less than 1, which indicates that it does not have the desired stability level in these two systems. However, the wheat system has a higher ESI value than the barley system and it can be said that in terms of stability, the system The atmosphere is a bit more stable.

Ecological load, Ecological Sustainability, Barley, Corn, Sorghum, Sustainable agriculture, Wheat