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**The Thesis Submitted for the Degree of M.Sc
in Agroecology**

**Study of production sustainability and economic
productivity of oil plant production in Sistan using
emergy and economic analyses**

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Abstract

To evaluate oil plants in Sistan region, the ecological sustainability and the productivity of using production inputs were compared in three oil crops including rapeseed, safflower and sesame in the 2020-2021 crop year by using energy and economic analysis techniques. The research data was collected and calculated both by a questionnaire and by face-to-face interviews with farmers to determine the amount of input consumption in production systems of these products and their performance. The total emergy supporting rapeseed, safflower and sesame production systems was $7.28 * 10^{16}$, $4.75 * 10^{16}$, and $3.55 * 10^{16}$ MJ per hectare. The highest share of total emergy input in all three studied systems belonged to non-renewable environmental inputs. Their shares were 83.42% for Rapeseed, 80.11% for safflower, and 84.41% for sesame production systems. The values of emergy indicators (ESI, ESI*), renewability percentage (R%), environmental load (ELR, ELR *), and the modified version of the investment ratio (EIR*) in the safflower system represented its higher ecological sustainability. According to emergy indices, the main cause of lower sustainability in rapeseed and sesame systems was high energy input share which is related to organic matter losses and soil erosion resulting from non-renewable environmental sources. Economic analysis also showed that the ratio of profit to cost and net profit in sesame production system was higher than the safflower and canola systems. This study reflects the differences between environmental performance and economic performance in production systems.

Keywords: Oil plants, Economic analysis, Ecological sustainability, Environmental load, Environmental inputs