

## **Abstract**

This research was conducted in Bojnord County, Iran, to identify the environmental effects of edible onion production, irrigated and dryland wheat and their role in the emission of pollutants to water, soil and air during 2016. The life cycle assessment with a cradle-to-gate approach and water footprint index was used to analyze an environmental load of these products while a functional unit of one ton of produced crop was adopted. The data was collected from meteorological organizations, North Khorasan Agriculture Jihad, distribution of surveys among local farmers and databases such as Ecoinvent®3.0. SimaPro®8.3 was used for the initial analysis of the data. Nine impact categories are studied using the CML 2 baseline method. To determine the correlation between farm size and global warming potential (GWP), the surveyed farms were grouped into three different clusters for each product, and then statistically compared using SAS®9.1 and Minitab®16.2. In order to calculate the water footprint index, AquaCrop®6.0 was used and the ET<sub>0</sub> was calculated using CropWat software. The results indicated that in most impact categories, machinery and electricity have the highest share among the inputs. GWP increases significantly by reducing the size of farms; in a way that GWP was calculated to be 18115.42 kg CO<sub>2</sub> eq ha<sup>-1</sup> in the smallest area under cultivation, which is a higher number than that calculated for larger areas under cultivation. The results of the water footprint showed that irrigated wheat had the highest blue water footprint. The onion had the highest proportion of blue water footprint to green water footprint, and the highest of the total water footprint was from dryland wheat. The most important proposition stated in this research is the improvement of larger areas under cultivation and the various levels of management in input applications.

**Keyword:** Global warming potential, Environmental impacts, Carbon dioxide, Green water, Blue water.



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**Supervisor:**

Dr. Mohammad R. Asgharipour

**Advisors:**

Dr. Saeid Soufizadeh

Dr. Amir Behzad Bazrgar

Dr. Fatemeh Karandish

**By:**

Saeideh Esmaeilzadeh

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