

Economic Evaluation of Artificial Lighting in Vegetable Greenhouses (Case Study: Cucumber Production in Hamadan Province)

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Abstract

Sunlight, as a natural resource, is an important factor in agriculture, which is supplied indefinitely and without any charge by the sun. But some phenomena such as cloudy weather or shortening the length of the day throughout the year, cause restrictions on access to this important source. This is very important for cultivation in controlled environments such as greenhouses, which usually produce off-season. This paper is aimed at evaluating the economic exposure of artificial lighting to increase cucumber production to compensate for the lack of light due to weather cloudiness. For this purpose, by using daily meteorological data of the study area and cucumber production from one of the greenhouses in Hamadan city, which didn't have artificial lighting system, the damage of cloudy hours was assessed. Daily time series data were collected for the period of April 2007 to July 2010, and the amount of crop reduction per hour of cloudiness was estimated by using an autoregressive distributed lag model (ARDL). Results showed that on the average, in each production period, atmospheric cloudiness has 3.8% negative effect on greenhouse cucumber production. On the other hand, based on this research's findings, compensating for the lack of sunlight due to atmospheric cloudiness by artificial lighting in this area isn't economically feasible, and the benefit/cost ratio is 0.11.

Keywords: Controlled environments, Cloudiness, Artificial Lighting, Cucumber yield, Economic assessment.

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