

Effect of carbon dioxide concentration and irrigation level on evapotranspiration and yield of red bean

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(Received: July 18-2011 ; Accepted: November14-2011)

Abstract

Increasing atmospheric CO₂ concentration affects plant activities directly. In order to investigate the effect of CO₂ concentration, an experiment was conducted at Research Greenhouse of College of Agriculture, Shiraz University, Shiraz, Iran. In this research, the effects of increasing CO₂ concentration from 350 to 750 mg/L were studied on growth and yield of red bean (*Phaseolus vulgaris*, cv. Naz) at four irrigation levels (1.2 FC, FC, 0.8 FC and 0.6 FC). In order to control CO₂ concentration, at the onset of the 4-leaf stage, pots were moved to wooden chambers covered with plastic. The results showed an average 15% decrease in evapotranspiration due to increasing the CO₂ concentration. Also the results indicated an increasing effect of CO₂ concentration on growth and yield of bean plants. Reducing the irrigation level to 0.6 FC caused the elevated CO₂ concentration not to have any significant effect ($P < 0.05$) on growth and yield of the red bean. By increasing the CO₂ concentration, number of seeds/plant at FC and 0.8 FC irrigation treatments increased by 13 and 11%, respectively. Moreover, increasing CO₂ concentration caused 20% increase in total seed yield. Total dry matter increased about 15% at higher CO₂ level. The conclusion of this research was that increasing CO₂ concentration has significant effect on yield and reduction of evapotranspiration of red bean.

Keywords: Carbon dioxide, Deficit irrigation, Bean, Evapotranspiration.

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