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

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Abstract

Increasing atmospheric CO_2 concentration affects plant activities directly. In order to investigate the effect of CO_2 concentration, an experiment was conducted at Research Greenhouse of College of Agriculture, Shiraz University, Shiraz, Iran. In this research, the effects of increasing CO_2 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 CO_2 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 CO_2 concentration. Also the results indicated an increasing effect of CO_2 concentration on growth and yield of bean plants. Reducing the irrigation level to 0.6 FC caused the elevated CO_2 concentration not to have any significant effect ($P<0.05$) on growth and yield of the red bean. By increasing the CO_2 concentration, number of seeds/plant at FC and 0.8 FC irrigation treatments increased by 13 and 11%, respectively. Moreover, increasing CO_2 concentration caused 20% increase in total seed yield. Total dry matter increased about 15% at higher CO_2 level. The conclusion of this research was that increasing CO_2 concentration has significant effect on yield and reduction of evapotranspiration of red bean.

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

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