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.