

Effect of Pollution and Ethylene-Diurea on Bean Plants Grown in KSA

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Abstract : The primary objectives of this investigation were to examine the interactive effects of three air quality treatments, ethylene-diurea (EDU) and two irrigation conditions on physiological characteristics of kidney beans (*Phaseolus vulgaris* L.) during its whole growth. These plants were grown in 12-open top chambers (OTC's). Ethylene-diurea (EDU) was used as a factor to evaluate O₃ pollution impact on plant growth. The air quality treatments consisted of charcoal filtered (CF) air, nonfiltered (NF) air and ambient air (AA) were irrigated and non- irrigated. Leaf samples were collected from upper canopy positions six times (pre- EDU addition, week after four EDU's addition, at the time of harvesting). Maximal differences in leaf carbohydrate, N contents, pigments and total lipids were observed in response to moisture conditions in presence and absence of EDU applications. Significant reduction were noted for air quality treatments regarding carbohydrate and pigment fractions but not for all cases of leaf N and lipid contents under O₃ effects only. Minimal differences were found for first EDU application while maximal ones were recorded at 200 mg l⁻¹ of treatments. The EDU treatments stimulated carbohydrate and pigment contents at the upper canopy position with higher levels for both NF and AA compared to untreated conditions. The NF and AA treatments caused lower total carbohydrate and pigment contents in the canopy position before harvesting of EDU applications. The stimulation in leaf carbohydrates by the EDU treatment, compared to the non-treated EDU of AA and NF treatments, provides a rational explanation for the counteracting effects of EDU against moderate exposures to O₃ regarding grain yields in C₃ plants.

Keywords : leaf contents, moisture relations, EDU additions, global climate change, kidney bean

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020