Effects of water stress at different growth stages on yield and yield components of common bean (Phaseolus vulgaris)

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Abstract

Common bean (*Phaseolus vulgaris* L.) has great potential for improving human nutrition due to its high protein content. However, water stress was found to be one of the major constraints to common bean production in Zimbabwe. A field experiment was therefore carried out at Agricultural Research Trust farm in early summer of 2004, and repeated at the same time in 2005, to determine the effect of water stress at different growth stages on grain yield and yield components of three common bean varieties. The experimental design was a 3 x 5 split-plot in a Randomised Complete Block Design; with water stresses as the main plot factor (withholding irrigation for a period of twenty-one days at; two weeks after emergence (WAE), four WAE, at flowering and two weeks after flowering (WAF) as well as non-stressed control) and the varieties in the subplot factor (Onyx, Pan 329 and Dark Red Kidney). Water stress significantly reduced grain yield ($p<0.05$) with flowering and two WAF stages being the most sensitive, and vegetative stage being the least sensitive. Water stress also produced significant effects ($p<0.05$) on yield components. Water stress during flowering and after flowering significantly reduced number of seed per pod and seed weight. For maximum yield, water stress must be avoided during flowering and pod-filling stages, so early planting is important under dry land planting.