Alleviation of water stress effects in cowpea by Bradyrhizobium spp. Inoculation

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Abstract

Experiments were carried out to investigate the effects of different degrees of water stress on cowpea in the presence and absence of Bradyrhizobium spp. inoculation and to evaluate physiological responses to stress. The soil used was Yellow Latosol, pH 6.3 and the crop used was cowpea (Vigna unguiculata (L.) Walp.) cv. `IPA 204'. Stress was applied continuously by the control of matric potential (ψm) through a porous cup. The lowered soil ψm had a direct effect on the N2 fixation, but the strains Bradyrhizobium introduced by inoculation in the cowpea plants were superior to the indigenous strain demonstrating the importance of inoculation in the stressed plants. At the more negative ψm plants inoculated with the strains EI 6 formed associations of greater symbiotic efficiency which helped the cowpea plants to withstand drought stress better than the strain BR 2001 and the uninoculated control. The leghaemoglobin concentration was not inhibited in the drought-stressed plants at ψm -70 kPa when inoculated with the strain EI 6, which confered a differential degree of drought resistance in plants. The ψw declined in the stressed plants reaching values of -1.0 MPa which was sufficient to cause disturbance in nodulation and biomass production.