20 POSTER 2-A

The effects of reduced water availability and salinity on the early seedling growth of soybean

Mohammad Khajeh Hosseini[1], Ian Bingham[2], and Alison A Powell[1]

1. Department of Agriculture, University of Aberdeen, Aberdeen, Scotland, U.K

2. Crops Division, SAC-Aberdeen, Craibstone Estate, Aberdeen, Scotland, U.K

In semi-arid environments, reduced water availability and salinity have been identified two major causes of reduced crop establishment. Therefore the effects of reduced water availability (using polyethylene glycol [PEG] 4000) and of salinity (NaCl) on the seedling growth of soybean (cv. Williams) was studied in paper towels for 10d at 22° C in the dark using a range of PEG 4000 and NaCl solutions that gave the same water potentials i.e. 0 to -1.5 MPa, 0-28% PEG, 0-331.8 mMolal NaCl. Seedling length was measured daily up to 10d following germination after which a number of root parameters were determined. In general both NaCl and PEG reduced seedling growth, although PEG had the more severe effect. Thus, after 10d at -0.73 MPa, seedling length was reduced to 28% and 22% of that the control in NaCl and PEG respectively. The effect of decreasing water potential was more severe on shoot than on root growth, therefore the main root: shoot length ratio in PEG increased and was greater than that in NaCl. The total seedling fresh weight, root weight and shoot weight of soybean all decreased as water potential decreased. The total root length (main axis+laterals), the number of lateral roots and mean lateral root length also showed a decrease as water potential decreased. However, the density of lateral roots on the main root axis increased with decreasing water potentials in both NaCl and PEG. Therefore the effects of water potential on the main root growth was greater than that on the number of lateral roots. The specific root length (SRL), which indicates the thickness of roots, decreased with decreasing water potential in both NaCl and PEG with the effects of NaCl being greater than PEG at any water potential. The greater thickness of roots in NaCl compared with that in PEG may be related to cell wall hardening in saline conditions.