

## NESTING MULTIPLE CONTROLLED ENVIRONMENTS FOR INDEPENDENT MANIPULATION OF SHOOT AND ROOT TEMPERATURES

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In nature, the roots and shoots of many crops are frequently exposed to greatly differing temperatures. We combined three environmental control systems to allow independent manipulation of shoot and root temperature for seedlings. Two growth chambers (Conviron PGW36, Winnipeg) were used to house apparatus within which the shoots and roots of juvenile maize were subjected to different temperatures. The maize plants were grown from seed in acrylic cuvettes, with a thin soil layer, which provided a means for researchers to quantitatively and non-destructively monitor root growth. The cuvettes were waterproofed and placed in covered water baths held at constant temperatures of 10, 15 and 20 °C. Above the baths, shoots were surrounded by acrylic boxes, within which the shoot temperatures were independently controlled. The chambers were maintained at a constant temperature and a data logger (Campbell Scientific, Logan) was used to individually control the cooling and heating of the water baths and acrylic boxes.