**The relative importance of seminal and nodal roots in supplying water and nitrogen to wheat**

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Roots of wheat plants are frequently injured or have restricted growth so that the development of grain often depends on either seminal or nodal roots. Glasshouse experiments have shown that in a low-tillering wheat isoline, but not in a high-tillering isoline, restriction of soil water from the three-leaf stage caused a reduction in dry matter and yield when seminal roots, but not nodal roots, were water stressed. In 1988 the ability of the two root systems to contribute to the water and nutrient supply of a wheat crop in the field was investigated.

**Methods**

Two isogenic lines of wheat differing in tiller number were grown in the field at Floreat Park, WA. The plants were grown at crop densities, with either seminal, nodal, or neither root system restricted by growing that part of the roots in shallow, buried troughs of soil. Water and fertilizer were supplied to each of the two root systems separately. Leaf, tiller and nodal root numbers and growth rates were recorded and dry matter production measured.

**Results and discussion**

600 mm fell in the 1988 season in Perth and produced acute nitrogen deficiency through leaching. In both isogenic lines confining the seminal Or nodal roots had a suppressive effect on biomass production, led to increased leaf senescence and floret death. In the high-tillering line greater tiller mortality occurred when seminal rather than nodal roots were confined within small soil volumes (Fig. 1).

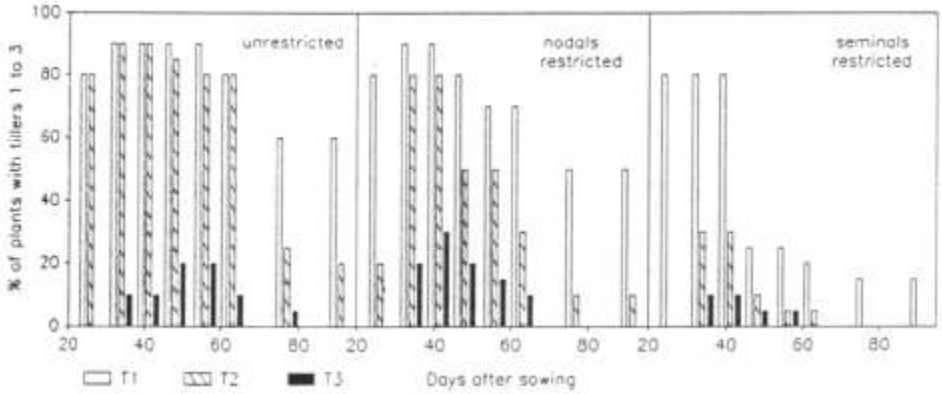


**Figure 1. The effect on mortality of tillers (T1, T2, T3) of restricting the soil volume of either nodal or seminal roots compared to plants where both systems grew freely through the soil.**

The early restriction of seminal roots reduced growth and tiller development more, because nodal roots are phenologically delayed and not extensive enough to compensate for loss of seminal root function. Further experiments in a drier environment will be conducted to resolve the question of the relative efficiency of the two root systems in supplying water in the field.