

Fusarium pseudograminearum crown rot: growth patterns in planta

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ABSTRACT. Crown rot (causal agent *Fusarium pseudograminearum*) is a major constraint on wheat production in Australia and globally. While discolouration of tissues is commonly used to screen for resistance, the degree to which the pathogen colonises the full range of seedling and adult host tissues is an important aspect of the disease process. After coleoptile inoculation, seedlings were examined using quantitative PCR to determine the spread of *F. pseudograminearum* into different host tissues during crown rot pathogenesis at 14 and 28 days after inoculation. Quantitative PCR and visual assessment indicated that while most seedling tissues (leaf sheath, leaf blade, sub-crown internode, primary root and secondary root) were colonised, the basal portion of leaf sheath tissue supported the highest density of *F. pseudograminearum*. Microscopic assessment demonstrated the growth of hyphae predominantly in the parenchyma cells, with passage into and out of seedling shoot tissues being predominantly via stomata. Assessment of colonised stem tissues in inoculated field trials of adult plants at 16 and 22 weeks after planting indicate a strong correlation between visual discolouration and fungal biomass, with the discolouration occurring in the parenchymatous hypoderm. Hyphae spread from the culm base vertically through the tissues, initially via the hypoderm and the central pith cavity. Colonisation of sclerified cells occurs later in the disease process. Both xylem and phloem tissues became colonised by 16 weeks after planting in all host genotypes tested. Nodal tissues do not appear to constitute any major impediment to the spread of fungal infection. The observation of *F. pseudograminearum* colonisation of vascular tissues is consistent with the hypothesis of compromised vascular flow of either or both of the xylem and phloem pathways during crown rot disease.

Oral presentation preferred.