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The tolerance of *Pinus patula* × *Pinus tecunumanii*, and other pine hybrids, to *Fusarium circinatum* in greenhouse trials

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Abstract The field survival of *Pinus patula* seedlings in South Africa is frequently below acceptable standards. From numerous studies it has been determined that this is largely due to the pitch canker fungus, *Fusarium circinatum*. Other commercial pines, such as *P. elliottii* and *P. taeda*, show good tolerance to this pathogen and better survival, but have inferior wood properties and do not grow as well as *P. patula* on many sites in the summer rainfall regions of South Africa. There is, thus, an urgent need to improve the tolerance of *P. patula* to *F. circinatum*. Operational experience indicates that when *P. patula* is hybridized with tolerant species, such as *P. tecunumanii* and *P. oocarpa*, survival is greatly improved on the warmer sites of South Africa. Field studies on young trees suggest that this is due to the improved tolerance of these hybrids to *F. circinatum*. In order to test the tolerance of a number of pine hybrids, the pure species representing the hybrid parents, as well as individual families of *P. patula* × *P. tecunumanii*, a series of greenhouse screening trials were conducted during 2008 and 2009. The results indicated that species range in tolerance and hybrids, between *P. patula* and these species, are intermediate in tolerance to *F. circinatum*. Within *P. patula* × *P. tecunumanii*, large family variation exists when pollen from the high elevation source of *P. tecunumanii* is used. The results of these studies illustrate the importance of developing pine hybrid breeding programs to overcome the susceptibility of our pure species to pathogens such as *F. circinatum*.

Keywords Forestry · Disease tolerance · Hybrids · Greenhouse screening

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