Title *Penicillium* species associated with preharvest wet core rot in South Africa and their pathogenicity on apple

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Abstract

Symptoms associated with the core region of apple fruits (*Malus domestica*) can be classified as moldy core (MC), wet core rot (WCR), and dry core rot (DCR). Infections leading to WCR are thought to occur primarily postharvest, although in South Africa preharvest symptoms also have been reported. The first aim of this study was to investigate the causative agent(s) of preharvest WCR by isolating fungi from eight internal positions in asymptomatic, MC, WCR, and DCR fruits. Secondly, the pathogenicity and virulence of all *Penicillium* isolates were investigated using three apple fruit inoculation methods: surface wounding, deep wounding, and nonwounding. Isolation of fungi from WCR fruits showed that *Penicillium* was the predominant fungal genus from most isolation positions including the lesion area. *Penicillium ramulosum* was the predominant species isolated from all fruits. However, in WCR fruits, the incidence (58%) of *P. ramulosum* was much higher than in MC (6%), DCR (7%), or asymptomatic (7%) fruits. Less frequently isolated *Penicillium* species included *P. expansum* and a few other species. Pathogenicity testing using the nonwounding method was best at discriminating highly virulent isolates. *P. expansum* was the most virulent species, followed by a putative new *Penicillium* species with closest sequence similarity to *P. dendriticum*. *P. ramulosum* isolates, although showing varying degrees of virulence, all had low virulence, causing only small lesions in wounded apple fruits.