

Title Yield loss in apple caused by *Monilinia fructigena* (Aderh. & Ruhl.) honey, and spatio-temporal dynamics of disease development

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Abstract

Monilinia fructigena (Aderh. & Ruhl.) Honey causes considerable yield losses in pome fruit culture. During a field study in the Netherlands in 1997 and 1998, the increase in disease incidence in time was assessed and final pre- and post-harvest losses were recorded in the susceptible apple cultivars James Grieve and Cox's Orange Pippin. Each individual tree was considered as a unique quadrat, and the spatial distribution of diseased fruits among fruit trees at every assessment date was characterised by a dispersion index, Lloyd's index of patchiness (LIP). Spatial autocorrelation was applied to detect potential clustering of trees with diseased fruits within rows. In cv. James Grieve, the rate of increase of disease incidence was constant up to harvest time, whereas in cv. Cox's Orange Pippin disease incidence increased markedly 3 weeks before harvest time, which coincided with the harvest of cv. James Grieve in neighbouring rows. Pre-harvest disease incidence was 4.2–4.3% in cv. James Grieve in both years, in cv. Cox's Orange Pippin this was 4.4% in 1997 and 2.7% in 1998. Post-harvest yield losses amounted on average 1.5–2.0% for both cultivars, no significant differences were found between the cultivars (*t*-test, $P=0.05$). Both in 1997 and 1998, clustering of diseased fruits among fruit trees was detected; LIP values were significantly higher than 1 ($P=0.05$ in 1997, $P=0.01$ in 1998). Clustering of trees with diseased fruits was detected in 1998, when significant ($P=0.05$) positive correlation coefficients occurred for 2nd, 3rd and 4th lag-order distances in cv. James Grieve, and a significant ($P=0.05$) positive first-order correlation in cv. Cox's Orange Pippin. Wounding agents, such as insects and birds, may play an important role in the underlying disease dynamics, and crop losses may be minimised by control of these agents.