

Swiss needle cast (SNC) is a fungal disease of Douglas-fir (*Pseudotsuga menziesii*) that has recently become prevalent in coastal areas of the Pacific Northwest. We used growth measurements and stable isotopes of carbon and oxygen in tree-rings of Douglas-fir and a non-susceptible reference species (western hemlock, *Tsuga heterophylla*) to evaluate their use as proxies for variation in past SNC infection, particularly in relation to potential explanatory climate factors. We sampled trees from an Oregon site where a fungicide trial took place from 1996 to 2000, which enabled the comparison of stable isotope values between trees with and without disease. Carbon stable isotope discrimination ($\Delta^{13}\text{C}$) of treated Douglas-fir tree-rings was greater than that of untreated Douglas-fir tree-rings during the fungicide treatment period. Both annual growth and tree-ring $\Delta^{13}\text{C}$ increased with treatment such that treated Douglas-fir had values similar to co-occurring western hemlock during the treatment period. There was no difference in the tree-ring oxygen stable isotope ratio between treated and untreated Douglas-fir. Tree-ring $\Delta^{13}\text{C}$ of diseased Douglas-fir was negatively correlated with relative humidity (RH) during the two previous summers, consistent with increased leaf colonization by SNC under high humidity conditions that leads to greater disease severity in following years.