#066

Next generation molecular fungicides: control of Sclerotinia sclerotiorum using RNA interference technologies

Mark Belmonte
Steve Whyard, Philip Walker, Nick Wytinck

University of Manitoba, Winnipeg, Canada

Sclerotina sclerotiorum, the causal agent of white mold, infects over 450 species of plants worldwide and causes billions of dollars in damage to crop yield. Sclerotinia is a persistent problem for rapeseed growers that has traditionally been managed using broad-spectrum fungicides. However, current fungicide strategies have proven less effective and crop rotations fail due to the promiscuous host range of Sclerotinia and the formation of durable resting structures known as sclerotia. Thus, there is an immediate need to manage Sclerotinia using environmentally-friendly species-specific control methods. Our novel strategy exploits the inherent cellular defense process known as RNA interference (RNAi). Upon encountering a double stranded RNA (dsRNA) molecule, the cell processes the dsRNA specifically targeting transcripts with sequence homology. Using a re-designed bioinformatics approach, we identified Sclerotinia-specific target genes. RNAi knockdown was confirmed using quantitative real-time PCR on RNA isolated from fungal liquid cultures. dsRNA molecules were screened for growth inhibition on the plant using a system representative of field conditions that showed up to 85% reduction in lesion spread. We then generated transgenic plants over-expressing good quality dsRNA and showed a more profound and prolonged tolerance to the fungus. We will provide insight into the utility of next generation molecular fungicides and their applicability to control pathogens.