Using RNA interference to protect crops against fungal pathogens

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Sclerotina sclerotiorum, the causal agent of white mold, infects over 600 species of plants worldwide. *Sclerotinia* is a persistent problem for global food production 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 novel species-specific control methods. Our 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 canola over-expressing good quality dsRNA and showed a more profound and prolonged tolerance to the fungus. Finally, I will provide insight into the uptake mechanisms and utility of next generation molecular fungicides and their applicability to control pathogens.

Key words: *Botrytis cinerea*, *Brassica napus*, RNA interference, RNA sequencing, *Sclerotinia sclerotiorum*