RNA silencing or RNA interference (RNAi) is an essential mechanism in animals, fungi, and plants that functions in gene regulation and defense against foreign nucleic acids. In fungi, RNA silencing has been shown to function primarily in defense against invasive nucleic acids, including mycoviruses, for which can be used to probe the functions of RNA silencing genes in fungi. Recent interests in RNAi or dsRNA-based pest control is driving our research to the utility of dsRNA-based strategy for environmental friendly fungal control. In this talk, I will present our findings on the roles of dicers (dcl-1 and dcl-2) as well as argonaute enzymes (agl-2 and agl-4) in small RNA metabolism in a plant pathogenic fungus *Sclerotinia sclerotiorum*. Gene disruption mutants were compared for changes in phenotype, virulence, viral susceptibility, and small RNA profiles. In vitro synthesized dsRNA targeting a specific gene further showed a significantly reduced average lesion diameter \((P < 0.05)\) on plant leaves compared to controls. Therefore, we have confirmed the effectiveness of RNA pesticides targeting *S. sclerotiorum* RNA silencing pathway for the control of the economically important pathogen. At the same time, we have established reverse genetic systems of several mycoviruses with biocontrol potentials.