A two genes – for – one gene interaction between Leptosphaeria maculans and Brassica napus

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Leptosphaeria maculans is a hemibiotophic ascomycete which causes stem canker of oilseed rape. That phytopathogenic fungus interacts with its host (*Brassica napus*) according to the gene-for-gene concept. The most economically and environment friendly method of control of stem canker is the genetic control by using host resistance. Single gene resistance is extremely efficient, but races of the pathogen virulent towards a resistance gene can appear in a few years and necessitates continuously new breeding programs. Moreover, specific resistances are rare in oilseed rape, and a lot of efforts are made to find other resistance genes in other *Brassica* species. To date, 11 interactions were genetically characterized between *L. maculans* avirulence genes and corresponding resistance genes in *Brassica*, and 5 of those avirulence genes were cloned. Recently, the avirulence gene *AvrLm10* which is recognized by the resistance gene *Rlm10* of the black mustard (*Brassica nigra*) has been cloned. *AvrLm10* corresponds in fact to two avirulence genes *AvrLm10_1* and *AvrLm10_2* which are located in the same AT-rich genomic region. They encore for small secreted proteins (SSP), are co-regulated and over-expressed 7 days post-infection. Each of them is necessary but not sufficient to induce resistance towards Rlm10. Silencing of one of those genes is sufficient to abolish recognition by *Rlm10*. Silencing by RNA interference of *AvrLm10-1* induces an increase of lesion size on oilseed rape leaves while silencing of *AvrLm10-2* has no major effect on aggressiveness of the fungus. That interaction of two avirulence genes against one resistance gene is therefore different from the classical gene-for-gene concept. It suggests that AvrLm10_1 and AvrLm10_2 could directly interact and / or that they could target the same plant protein. A Y2H screen suggested a direct interaction between AvrLm10-1 and AvrLm10-2. This interaction was confirmed with Bimolecular Fluorescence Complementation (BiFC) experiments. Coimmunoprecipitation experiments are also in progress to confirm this interaction.