NLR Network of Pepper Recognizes Multiple Effectors of Phytophthora infestans and Associate With Nonhost Resistance

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NHR (Non-host resistance) is a robust form of plant immune response associated with complex molecular mechanisms including ETI (effector-triggered immunity). In a recent report, multiple recognition of Phytophthora infestans RxLR effectors is suggested as an important molecular mechanism of NHR in pepper (Lee et al., 2014). To identify pepper NLRs which could trigger ETI by recognizing P. infestans effectors, we selected three among fifty-seven P. infestans core effectors from HR (hypersensitive response) cell death screening on pepper, and co-expressed with 415 pepper NLRs in Nicotiana benthamiana. But none of the pepper NLRs induced HR when co-expressed with candidate effectors in 1:1 manner. In this context, to investigate whether additional factors could be required for effector-triggered HR on pepper, we characterized fourteen NRC (NLR-required for cell death)-type helper NLR candidates of pepper from phylogenetic analysis using NLRs of four major Solanaceae plants (potato, tomato, pepper and tobacco), and tested whether these candidates could function downstream of recognizing P. infestans effectors. As a result, we confirmed that several pepper NRCs could function downstream of several R genes, which recognize well-known P. infestans effectors, such as Rpi-blb2, R1, and R8.

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