

Nonsense Mediated mRNA Decay Regulates Plant Immunity

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Abstract—Nonsense-mediated mRNA decay (NMD), an mRNA quality control process is considered to be one of the vital mechanisms present across the eukaryotes that strictly administers the stability of both aberrant and normal transcripts, thus ensures the decay of transcripts which would otherwise result into truncated proteins. It has been implicated in plant immunity. Number of plant resistance genes (R) vital for conferring plant immunity are NMD substrates, thus under normal growth conditions, the level of mRNA of these resistance genes are insignificant. Strikingly, a subset of transcripts of the Arabidopsis resistance genes are reportedly up regulated during bacterial infection due to a decrease in NMD efficiency. Plant immune genes are mostly of two types, they are TIR-NBS-LRR (TNL) and CC-NBS-LRR (CNL). Their transcripts retain characteristics of NMD regulation, thus they are natural NMS substrates. The perception of bacteria by pattern recognition receptors (PRRs) initiates the destruction of UPF1, UPF2 and UPF3 within 30 minutes of inoculation via the independent ubiquitination of UPF1 and UPF3 and the 26S proteasome pathway, and subsequently, NMD-sensitive TNL and CNL transcript levels increase. Our findings demonstrate how NMD works as the control node through which PRRs can fine-tune R transcript levels to reduce fitness costs and achieve effective immunity.

Keywords: Nonsense mediated mRNA decay, resistance, ubiquitination