

## Supporting Information

**Suppl. Table S1.** Summary of NRPS related gene clusters and genomes analyzed in this study.

**Suppl. Table S2.** List of life-stage specific transcriptomes of *M. incognita* used for MiATTR CDS matches in this study.

**Suppl. Table S3.** Results of statistical analysis in this study.

**Suppl. Table S4.** List of primers used in this study.

**Suppl. Figure S1.** 3D structural alignment of MiATTR and *A. nidulans* ATTR. A, A-domain; B, R<sub>1</sub> domain; C, R2 domain. Pink: MiATTR, green: *A. nidulans* ATTR.

**Suppl. Figure S2.** Confirmation of *Arabidopsis* positive transformants by PCR amplification of the target gene *Miatrr*, with plant gene UBP22 as control.

**Supple. Figure S3.** Effects of glycine betaine and choline on *M. incognita* survival and *Miatrr* expression after free-living J2s exposed to different concentration of the chemicals for 72 h. Percentage of *M. incognita* survival under stress of glycine betaine (A) and choline (B). Relative expression levels of *Miatrr* under stress of glycine betaine (C) and choline (D).