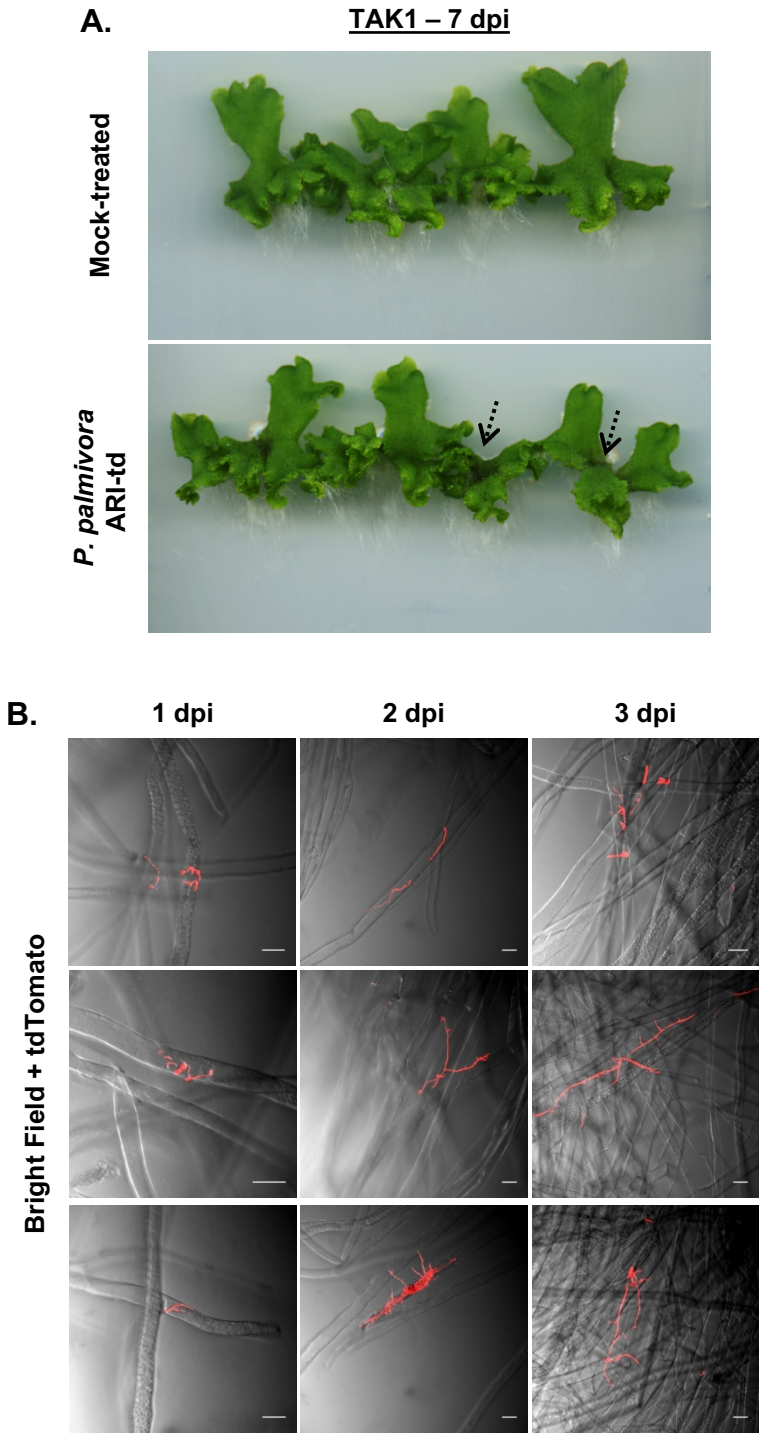

Fig S1. Rhizoid inoculations do not reliably lead to colonization

(A) Disease symptoms at 7 days post inoculation (dpi) of 3-week-old *M. polymorpha* (TAK1) plants that were inoculated with *P. palmivora* ARI-td zoospores or water directly onto rhizoids.

(B) Confocal fluorescence microscopy demonstrating *P. palmivora* ARI-td growth on 3-week-old *M. polymorpha* rhizoids from 1-3 dpi. Micrographs represent z-stack projections of merged bright field and tdTomato channels. Scale bars = 50 µm.

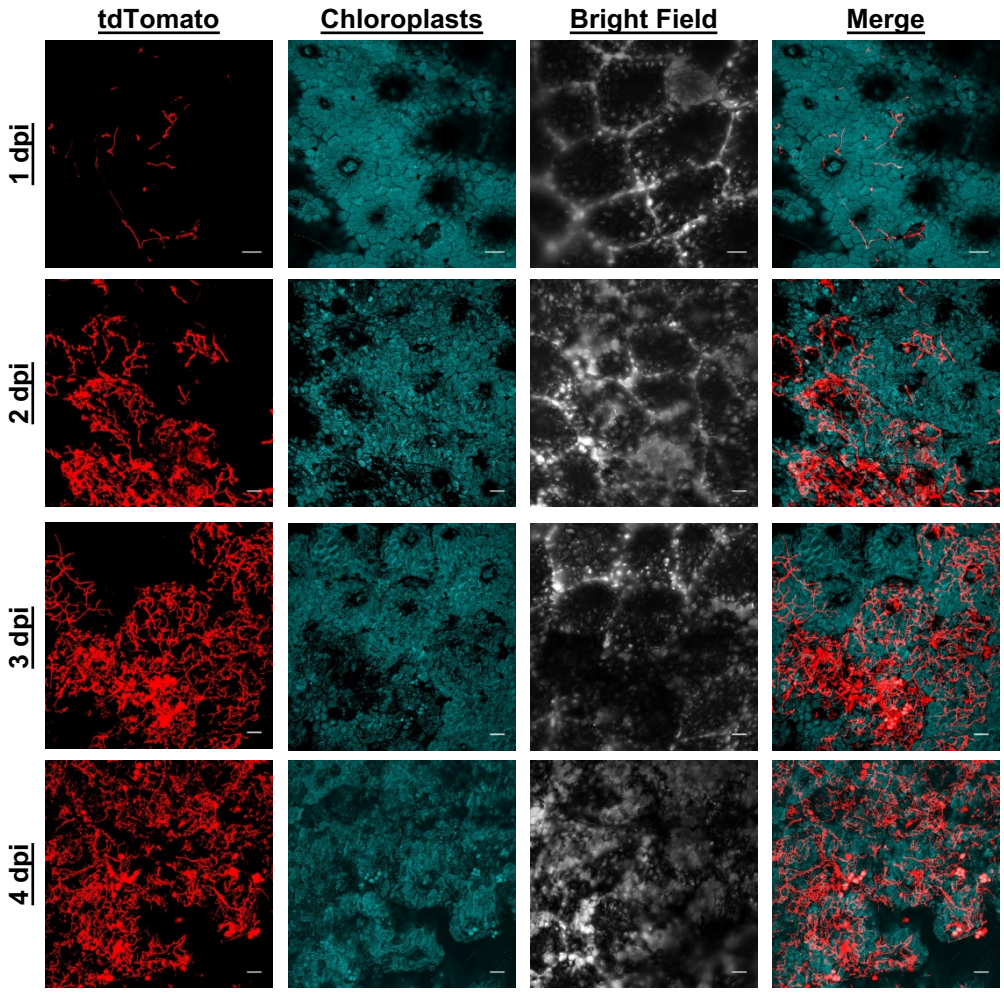

Fig S2. *P. palmivora* colonizes TAK1 thalli. Confocal fluorescence microscopy demonstrating *P. palmivora* ARI-td growth on 3-week-old *M. polymorpha* thalli from 1-4 days post inoculation (dpi). Micrographs represent z-stack projections. The merged micrographs display red pathogen fluorescence (tdTomato) overlaid on top of chlorophyll autofluorescence (turquoise). Scale bars = 100 µm.

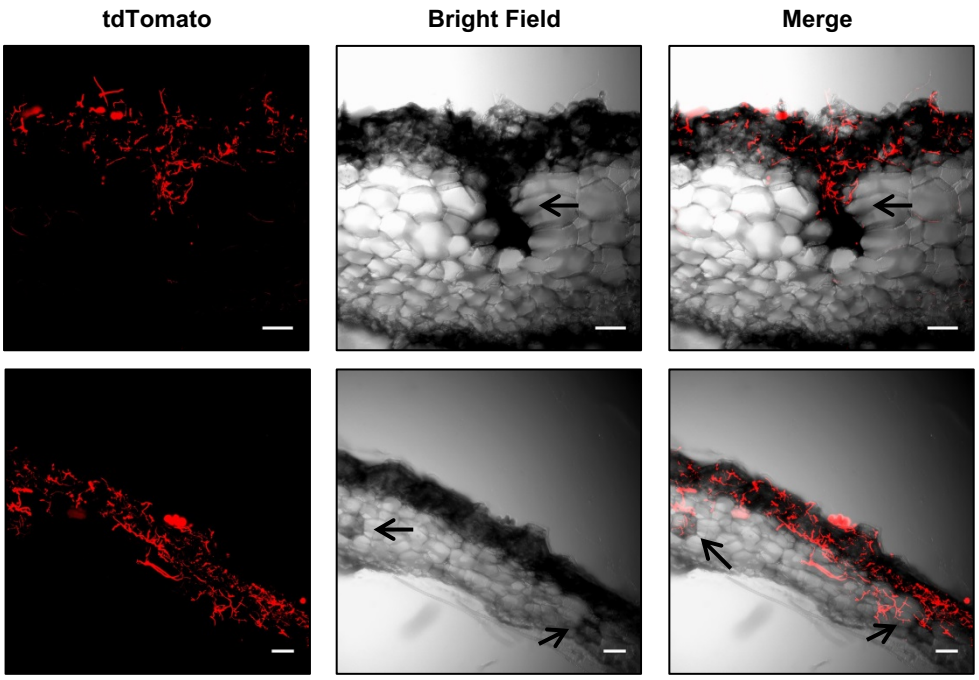

Fig S3. *P. palmivora* hyphae access the storage region during necrotrophy. Confocal fluorescence microscopy demonstrating the co-occurrence of *P. palmivora* ARI-td hyphae and necrotrophic disease symptoms in the storage region of *M. polymorpha* thalli at 7 days post inoculation (dpi). Red pathogen fluorescence is merged with bright field images. Micrographs represent z-stacked images. Scale bars = 100 µm.

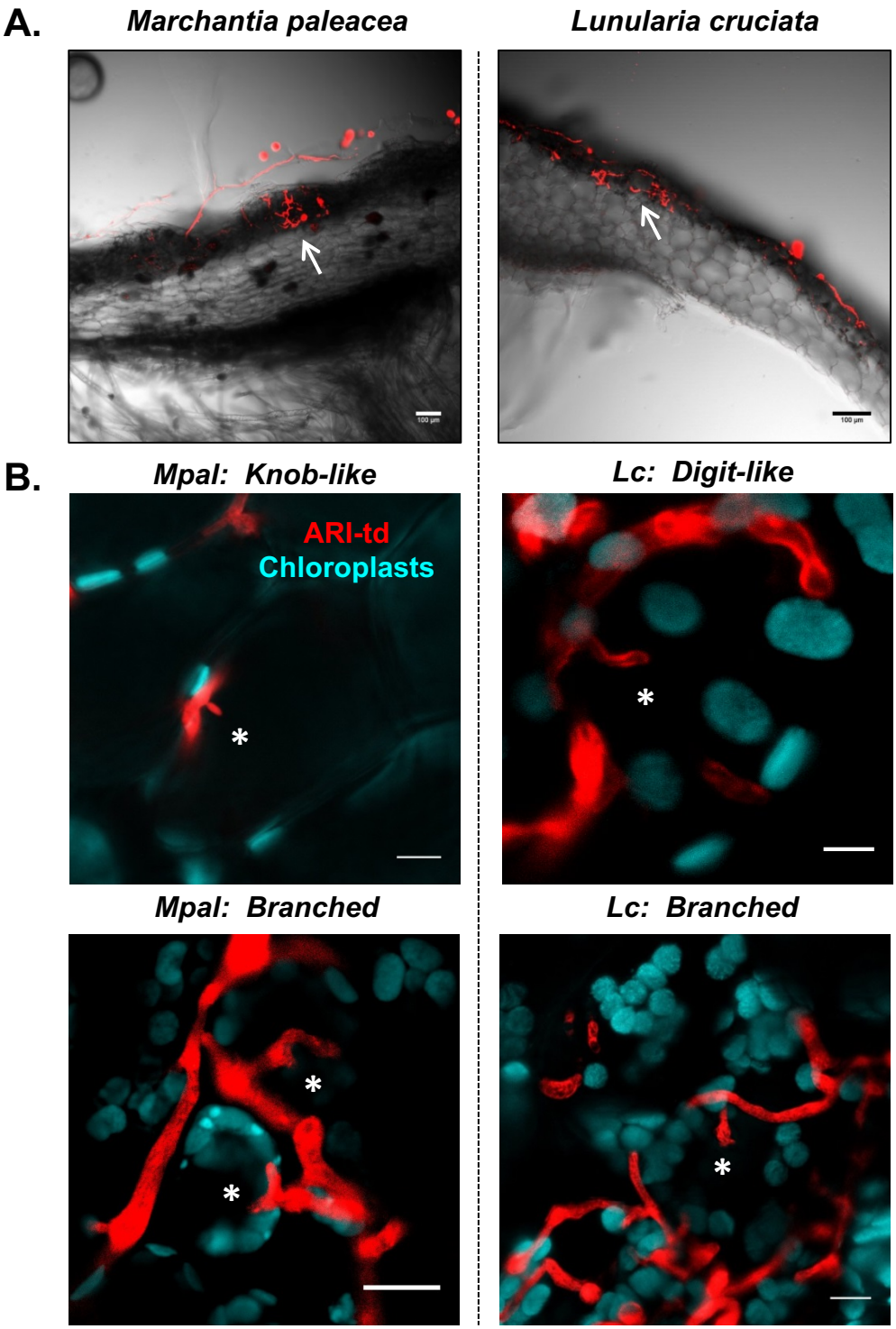

Fig S4. Biotrophic colonization of the photosynthetic layer in *Marchantia paleacea* and *Lunularia cruciata*.

(A) Confocal fluorescence microscopy of sectioned thalli of *M. paleacea* and *L. cruciata* colonized by *P. palmivora* ARI-td at 7 days post inoculation (dpi). Z-stacked images represent red pathogen fluorescence (tdTomato) merged with the bright field channel. Colonized air chambers are denoted by arrows. Scale bars = 100 µm

(B) Confocal fluorescence microscopy demonstrating haustoria morphology in *P. palmivora* ARI-td-colonized *M. paleacea* (*Mpal*) and *L. cruciata* (*Lc*) thalli at 3 dpi. Z-stacked images display red pathogen fluorescence (ARI-td) merged with plastid autofluorescence. Scale bars = 10 µm.

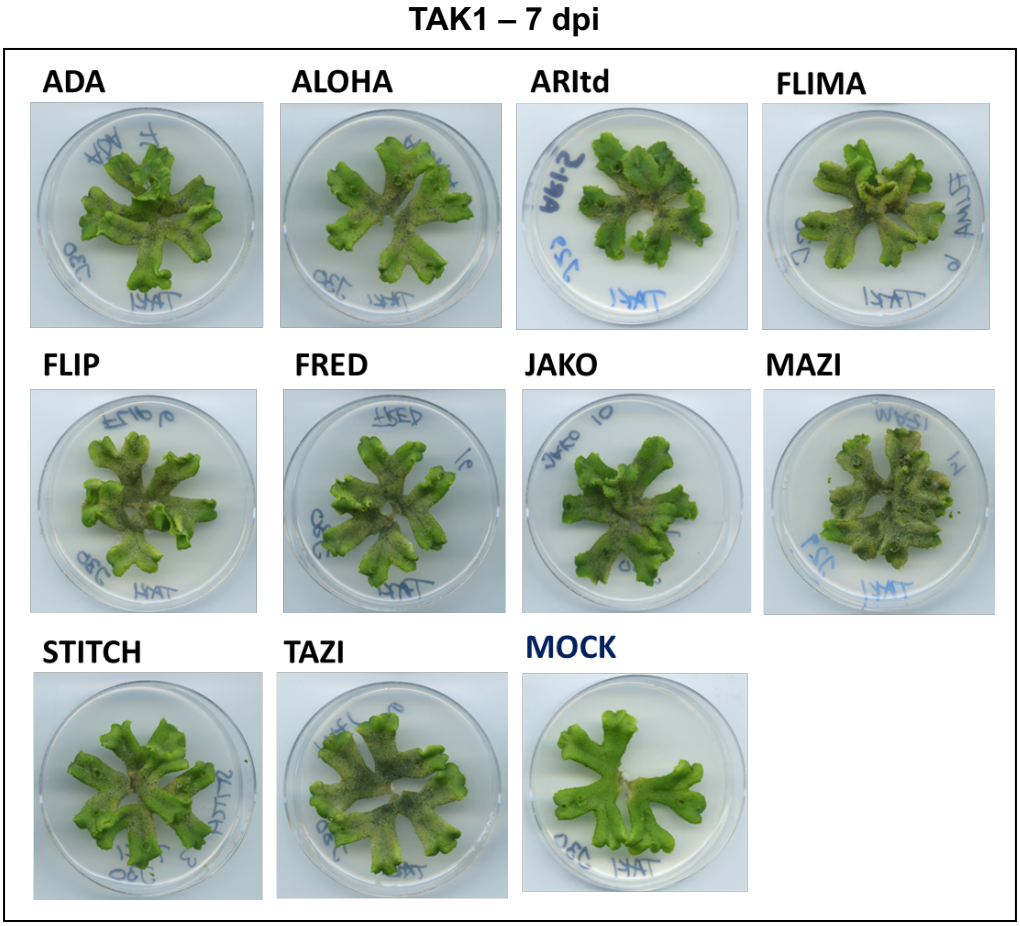

Fig S5. *P. palmivora* strains vary in aggressiveness in TAK1.

Disease symptoms of *M. polymorpha* TAK1 plants inoculated with water (mock) or zoospores of *P. palmivora* strains 7 days post inoculation (dpi). Images displayed are representative of consistent symptoms observed from 8-16 infected plants per strain.

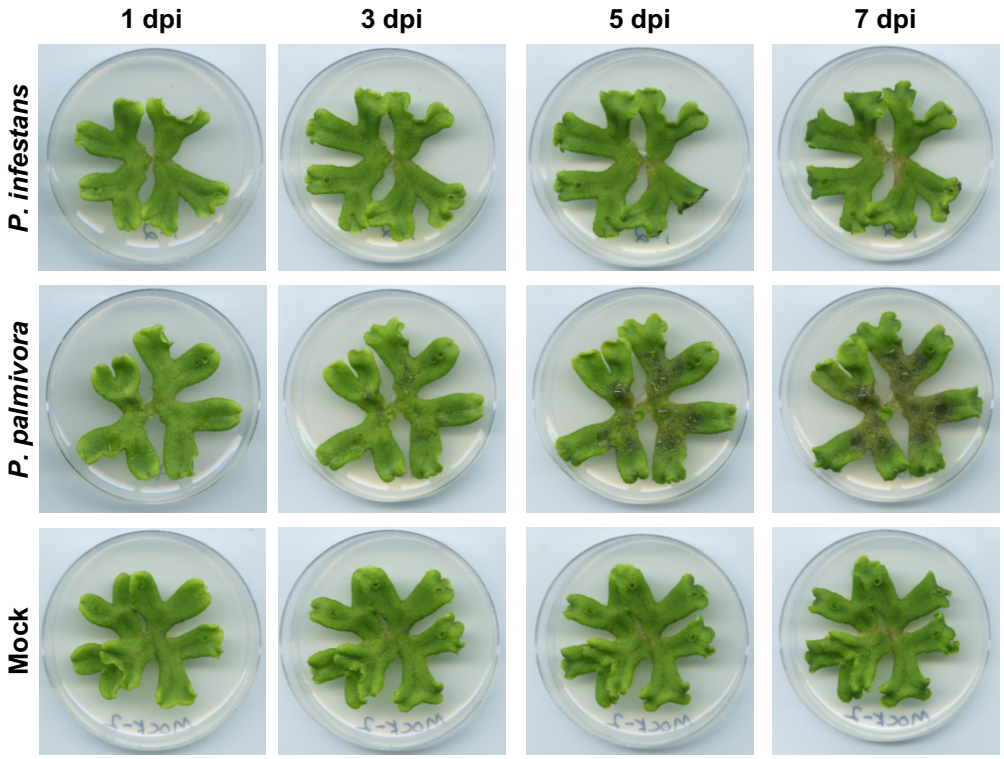

Fig S6. *P. infestans* does not cause disease symptoms on TAK1

Disease progression of *M. polymorpha* TAK1 plants inoculated with water, *P. palmivora* (ARI-td) zoospores or *P. infestans* (*Pi88069*-td) zoospores. Images display consistent disease symptoms (n=8) at 1, 3, 5, and 7 days post inoculation (dpi).

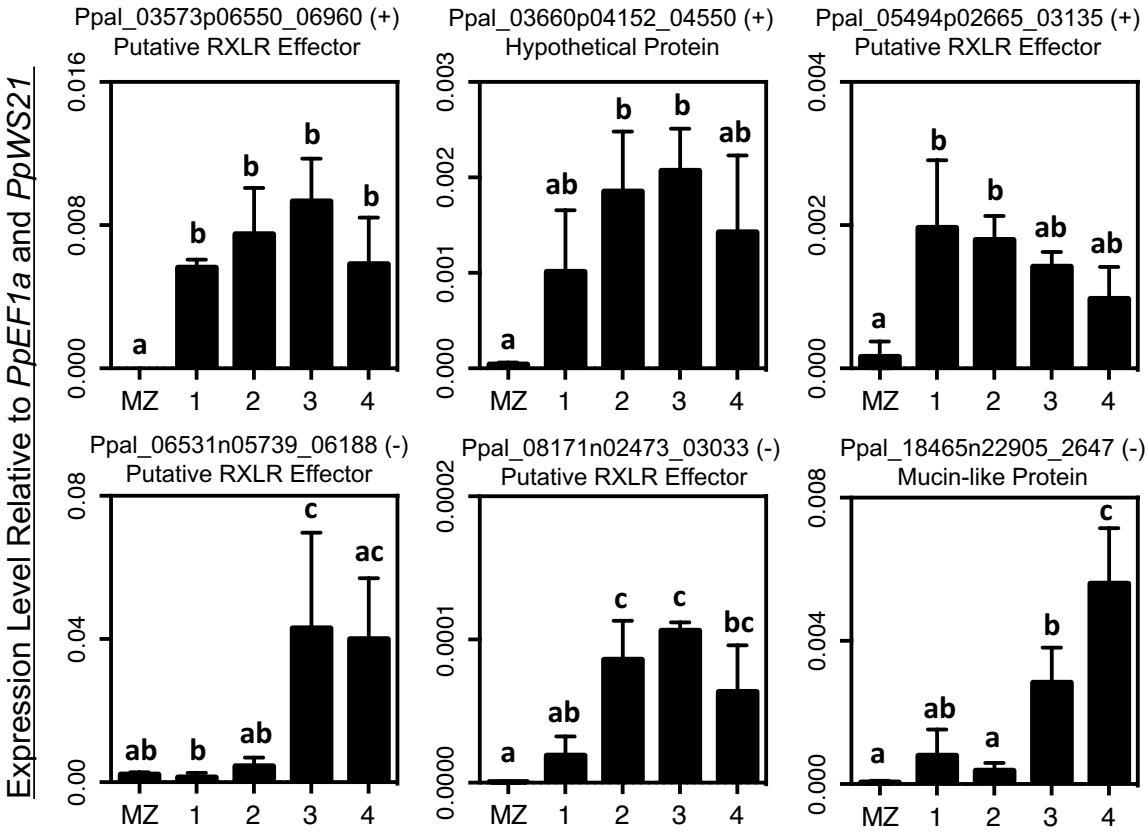

Fig S7. Validation of colonization-induced *P. palmivora* genes

qRT-PCR analysis of *P. palmivora* (ARI-td) genes identified by RNA-seq analyses. Expression levels were quantified in an axenically propagated MZ (mycelia + zoospores) sample and during the colonization of *M. polymorpha* thalli from 1-4 days post inoculation (dpi). Expression levels were quantified relative to internal controls *PpEF1a* and *PpWS21.* Different letters indicate statistically significant differences in expression levels (ANOVA, Tukey' HSD, $p < 0.05$). Performed twice with similar results.

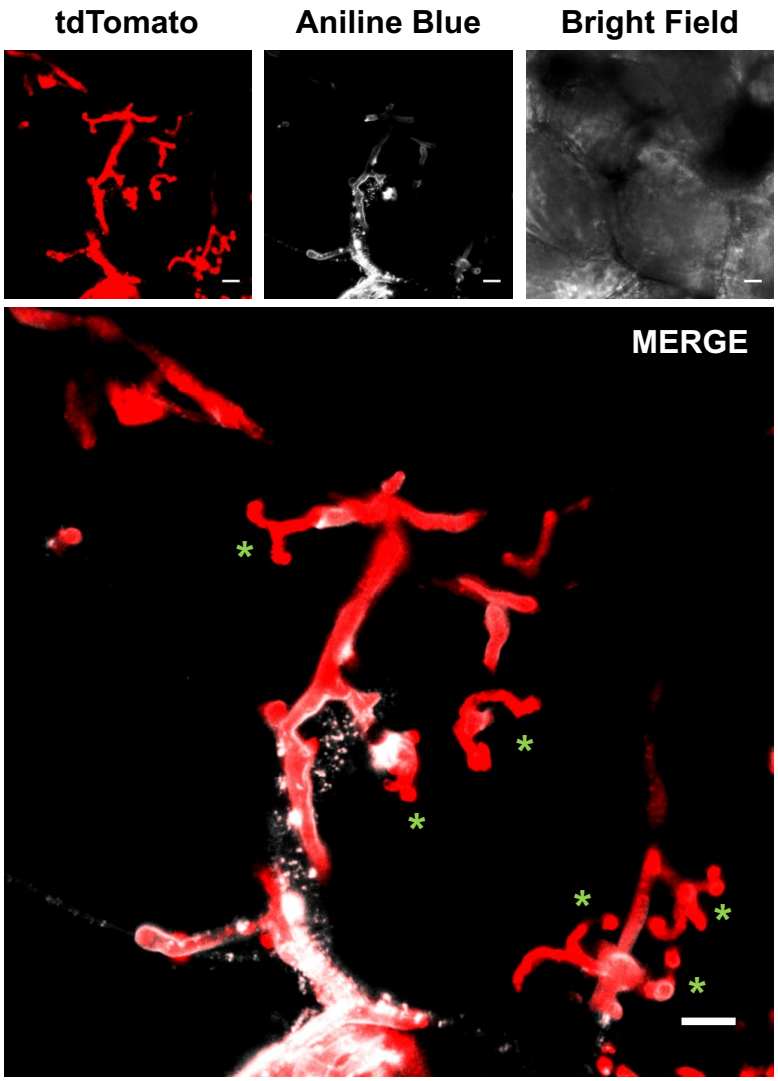

Fig S8. Callose does not envelope *P. palmivora* infection structures

Confocal fluorescence microscopy of aniline blue stained *M. polymorpha* TAK1 thalli infected with *P. palmivora* ARI-td at 3 days post inoculation (dpi). Images represent z-stack projections displaying red fluorescence from the pathogen (tdTomato), callose deposition through aniline blue staining (white), bright field, or tdTomato merged with aniline blue. Asterisks (*) denote intracellular infection structures that are not enveloped by callose.

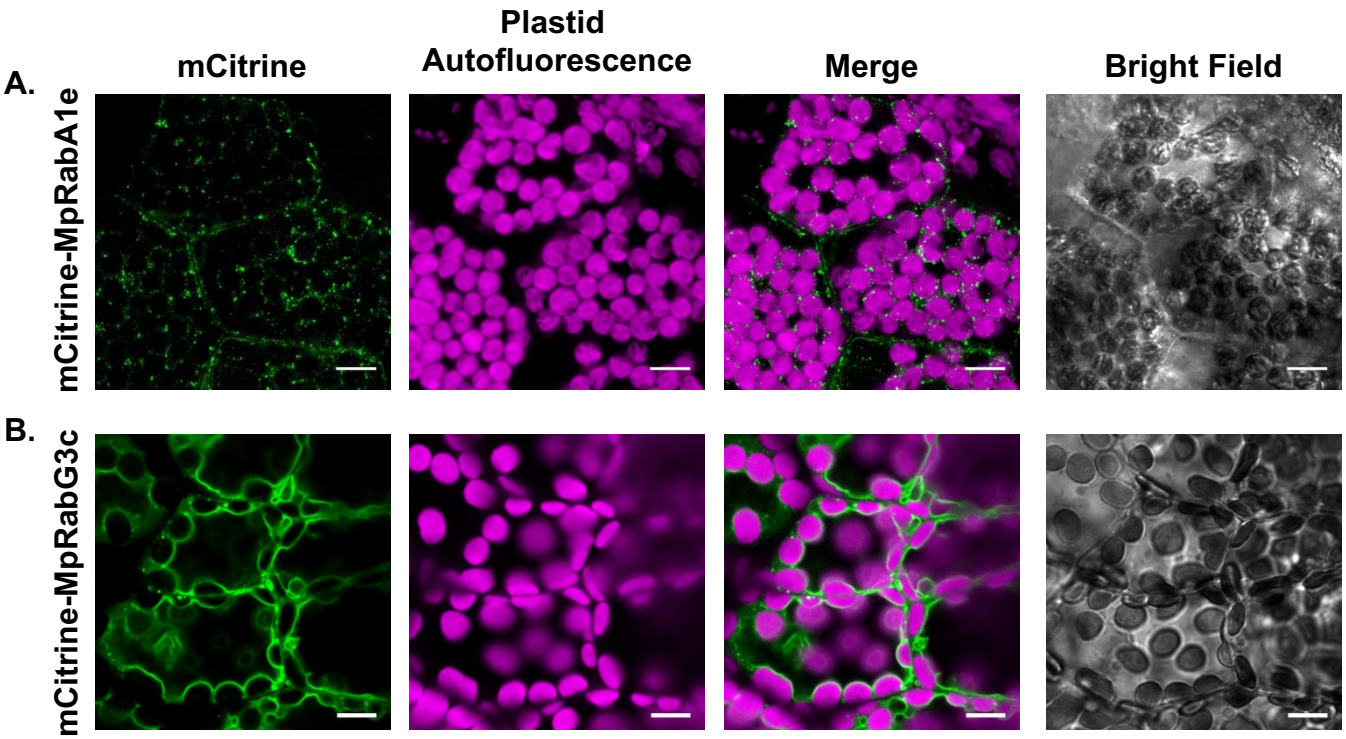

Fig S9. Subcellular localization of MpRabA1e and MpRabG3c

(A) Confocal fluorescence microscopy showing subcellular localization patterns of MpRabA1e in 35S:mCitrine-MpRabA1e/TAK1 gemmae. Micrographs display mCitrine fluorescence, plastid autofluorescence (magenta), both channels merged, or bright field images. Scale bars = 10 μm.

(B) Confocal fluorescence microscopy showing subcellular localization patterns of MpRabG3c in 35S:mCitrine-MpRabG3c/TAK1 gemmae. Micrographs display mCitrine fluorescence, plastid autofluorescence (magenta), both channels merged, or bright field images. Scale bars = 10 μm.