

1. Supplementary tables

Table S1. Primers used in this study.

primers	Paired sequences	Purpose
H ₂ BGFP_pjet/LB_F1	GATCTTCCGGATGGCTCGAGGATGGATTGGAGTAGGTTTGGTG	Verification of construction vector
H ₂ BGFP_GFP/LB_R1	GCTCCTCGCCCTTGCTCACCATGGCGCGCCTTTGGCAGACGAAGATGAAT ACT	
H ₂ BGFP_LB/GFP_F2	ATTCATCTTCGTCTGCCAAAAGGCGGCCATGGTGAGCAAGGGCGAGGAG	Verification of construction vector
H ₂ BGFP_hph/GFP_R2	GACCTCCACTAGCATTACACTTCTACTTGTACAGCTCGTCCATG	
H ₂ BGFP_GFP/hph_F3	GGACGAGCTGTACAAGTAGAAGTGTAATGCTAGTGGAGGTCAACA	Verification of construction vector
H ₂ BGFP_RB/hph_R3	GAAACCAAAAAAATAATACGCTGGGGGGAGTTTAGGGAAAGAGC	
H ₂ BGFP_hph/RB_F4	CCTAAACTCCCCCAGCGTATTAAGTTTTTTGGTTTCGC	Verification of construction vector
H ₂ BGFP_pjet/RB_R4	ATTGTAGGAGATCTTCTAGAGTGCAACTTAAACCCTCCGAAG	
H ₂ B-YZ-F	CCGAACAGAATTTAATCTGA	Verification of construction vector
H ₂ B-YZ-R	GCGGAGCGAGGATAAGCATT	
EGFP-Probe-F	ACGTAAACGGCCACAAGTTC	Southern blotting verification
EGFP-Probe-R	TGCTCAGGTAGTGGTTGTCG	
RT-GFP-F	GGTGAACCTCAAGATCCGCC	Analysis of RT-PCR
RT-GFP-R	CTTGTACAGCTCGTCCATGC	
RT-β-tublin-F	TCGGTGGAGGTACTGGTT	Analysis of RT-PCR
RT-β-tublin-R	GAGTGTTCGAGGGTGGTG	

2. Supplementary figures

Figure S1. Analysis of *A. oligospora* digestive nematodes. (A) Fluorescence observation of mature nematode captured by fungi in different planes. Yellow arrow: *C. elegans*. Blue arrow: traps. Bar: 100 μm . (B) Fluorescence observation of young adult nematode captured by fungi in different planes. Yellow arrow: *C. elegans*. Blue arrow: traps. Bar: 100 μm . (C) The traps and captured nematodes of the H₂B positive strains were observed via SEM. Left: Traps captured a large number of nematodes. Yellow arrow: the captured nematodes. Blue arrow: conidium. Bar: 500 μm . Right: An enlarged schematic of the red dashed box in the left image. Through SEM analysis, it was found that the mycelium had entered the nematode body. Red arrow: the outline of nematode. Bar: 50 μm . (D) Hyphae were stained with CFW, and traps of the H₂B positive strains were observed. Red arrow: septum.

Figure S2. Comparison of mycelial growth between wild type (WT) and H₂B positive strains. (A) Colonial morphologies of WT and H₂B positive strains incubated on PDA, TYGA, TG, CMY and CMA medium at 28°C for 5 days. Due to the sparse hyphae on CMA media, the edges of the colonies are marked with red circles. (B) The mycelial growth rate of WT and H₂B positive strains cultured on five different media in Figure S2A. The number after H₂B represents three independent H₂B positive strains.

Figure S3. Comparison of conidiation, trap formation and nematicidal activity in WT and H₂B positive strains. (A) The conidial yields of WT and H₂B positive strains. (B) Comparison of the spore germination of WT and H₂B positive strains at 4, 8, and 12 h. (C) Comparison of traps produced by WT and H₂B positive strains. (D) Comparison of nematode mortality caused by WT and H₂B positive strains. Error bars represent the standard deviations. Ns: No significant difference (Tukey's HSD, $P > 0.05$).

Figure S4. Observation of the formation process of traps of H₂B positive transformants. (A) Observation the induction of H₂B positive transformants by nematodes to produce a large number of traps. White arrow: traps. Bar: 50 μm . (B) Based on Figure S4A, SEM observations were conducted on the hyphae, traps, and captured nematodes. WT data unshown. Red arrow: conidium. Yellow arrow: septum. (C) Observation of the formation process of traps. White arrow: traps. Red arrow: the extended trap cell loop. Bar: 100 μm . (D) Fluorescence observation after 48 hours of spore germination. White arrow: traps. Blue arrow: hypha. Bar: 200 μm .

Figure S5. Analysis of conidiophore and germination tube of H₂B positive strains. (A) Morphological observation of conidium and conidiophore via white light. Bar: 200 μm . (B) The conidium and conidiophore were observed laterally by fluorescence microscope. Bar: 100 μm . (C) Observation of conidium and conidiophore from above. Bar: 100 μm . Yellow arrow: conidiophore. Red arrow: conidium. (D) Conidium sprouted a mycelium. (E) Conidium sprouted two hyphae. (F) Conidium sprouted three hyphae. Bar: 50 μm .

Red arrow: conidium. Black arrow: hyphae.

Figure S6. Analysis of nuclear localization at the tip of hyphae. **(A)** Fluorescence observation of the nucleus at the tip of the hyphae. Yellow arrow: septum. Red arrow: the nucleus near the tip of the hyphae. Bar: 25 μm . **(B)** The nucleus migrates towards the tip of the hyphae. **(C)** The nucleus migrates in the opposite direction to the tip of the hyphae. **(D)** After nuclear migration, there is a nucleus at the tip of the hyphae. **(E)** Analysis of nuclear localization at the tip of branching hyphae. Blue arrow: direction of nuclear migration. Red arrow: the nucleus near the tip of the hyphae. White triangle: the tip of the hyphae. Bar: 100 μm .

3. Supplementary videos

Video S1. Observation of traps capturing nematodes. Red arrow: traps. Yellow arrow: nematode eggs. Bar: 500 μm . The video was played at 100 \times speed.

Video S2. Spatial imaging analysis of traps based on EGFP.

Video S3. Analysis of nuclear behavior interaction between conidium and hyphal cells. Red arrow: conidium. Bar: 200 μm . The video was played at 100 \times speed.

Video S4. The nuclei evenly distributed in the mycelium were moving. Bar: 100 μm . White dotted line: hyphal outline. The video was played at 100 \times speed.

Video S5. Observation of nuclear division in hypha. Red arrow: the nucleus involved in division. Bar: 100 μm . The video was played at 150 \times speed.

Video S6. Nuclear behavior in the hyphal cells of H2B-EGFP-labeled strain. The nucleus could cross the adjacent nucleus and migrated to the tip of hypha. Red arrow: the nucleus that was crossed. Bar: 100 μm . The video was played at 100 \times speed.

Video S7. Analysis of nuclear migration in branching hyphae. Red arrow: migrated nucleus. Bar: 60 μm . White dotted line: hyphal outline. The video was played at 100 \times speed.

Video S8. Rapid migration of nuclei in mycelium. Red arrow: Rapidly migrated nuclei. Bar: 50 μm . White dotted line: hyphal outline. The video was played at 100 \times speed.