

Isolation and functional characterization of culture-dependent endophytes associated with *Vicia villosa* Roth.

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Table S1. Mycelium color of the identified fungi (morphological identification)

Isolate	Closest match	Color	NCBI Link
hvef1	<i>Cladosporium pseudocladosporioides</i>	Olive-black	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036245
hvef3	<i>Penicillium</i> sp.	Dull gray	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036247
hvef6	<i>Penicillium brefeldianum</i>	Green- brown	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036250
hvef7	<i>Cladosporium cladosporioides</i>	Light brown with dark margins	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036251
hvef9	<i>Penicillium ochrochloron</i>	Greenish	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036253
hvef10	<i>Penicillium glaucoroseum</i>	Light green	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036254
hvef12	<i>Trametes versicolor</i>	white	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036256
hvef18	<i>Penicillium simplicissimum</i>	Dark green	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036262
hvef22	<i>Penicillium cremeogriseum</i>	Green with white margins	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036266
hvef23	<i>Penicillium</i> sp.	Greenish	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036267
hvef26	<i>Cladosporium halotolerans</i>	Black with brown margins	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036270
hvef29	<i>Aspergillus flavus</i>	Yellow- green	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036273
hvef30	<i>Aspergillus</i> sp.	Blue to dark green	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036274
hvef31	<i>Cladosporium sphaerospermum</i>	Dark gray	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036275
hvef32	<i>Eutypella</i> sp.	chalky-white with black spot	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036276
hvef37	<i>Chordomyces antarcticum</i>	White to light yellow	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036281
hvef40	<i>Penicillium steckii</i>	Green with yellowish margins	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036284
hvef41	<i>Penicillium expansum</i>	Green- gray	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036285
hvef43	<i>Aspergillus westerdijikiae</i>	Yellow - orange	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036287
hvef44	<i>Aspergillus sydowii</i>	Blue green	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036288
hvef45	<i>Penicillium italicum</i>	Dull gray green	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036289
hvef46	<i>Penicillium svalbardense</i>	Light pale green	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036290
hvef47	<i>Penicillium</i> sp	Dark gray	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036291
hvef48	<i>Tricholoma matsutake</i>	light to dark brown	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036292
hvef50	<i>Penicillium</i> sp.	Light green with yellow margin	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036294
hvef52	<i>Penicillium</i> sp.	Olive-gray	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036296
hvef54	<i>Penicillium</i> sp.	White to pinkish	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036298
hvef55	<i>Penicillium griseopurpureum</i>	Blue to light green	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036299
hvef58	<i>Penicillium</i> sp.	Dull gray- green	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036302
hvef60	<i>Penicillium oxalicum</i>	Dark gray	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036304
hvef63	<i>Penicillium</i> sp.	chalky-white	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036307
hvef64	<i>Penicillium crustosum</i>	Dark green with dark margins	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036308
hvef65	<i>Penicillium</i> sp.	Dull green- white	https://www.ncbi.nlm.nih.gov/search/all/?term=MK036309



Figure S1. The overall pictures of all isolated fungi from different tissues of *Vicia villosa* in two growth conditions.

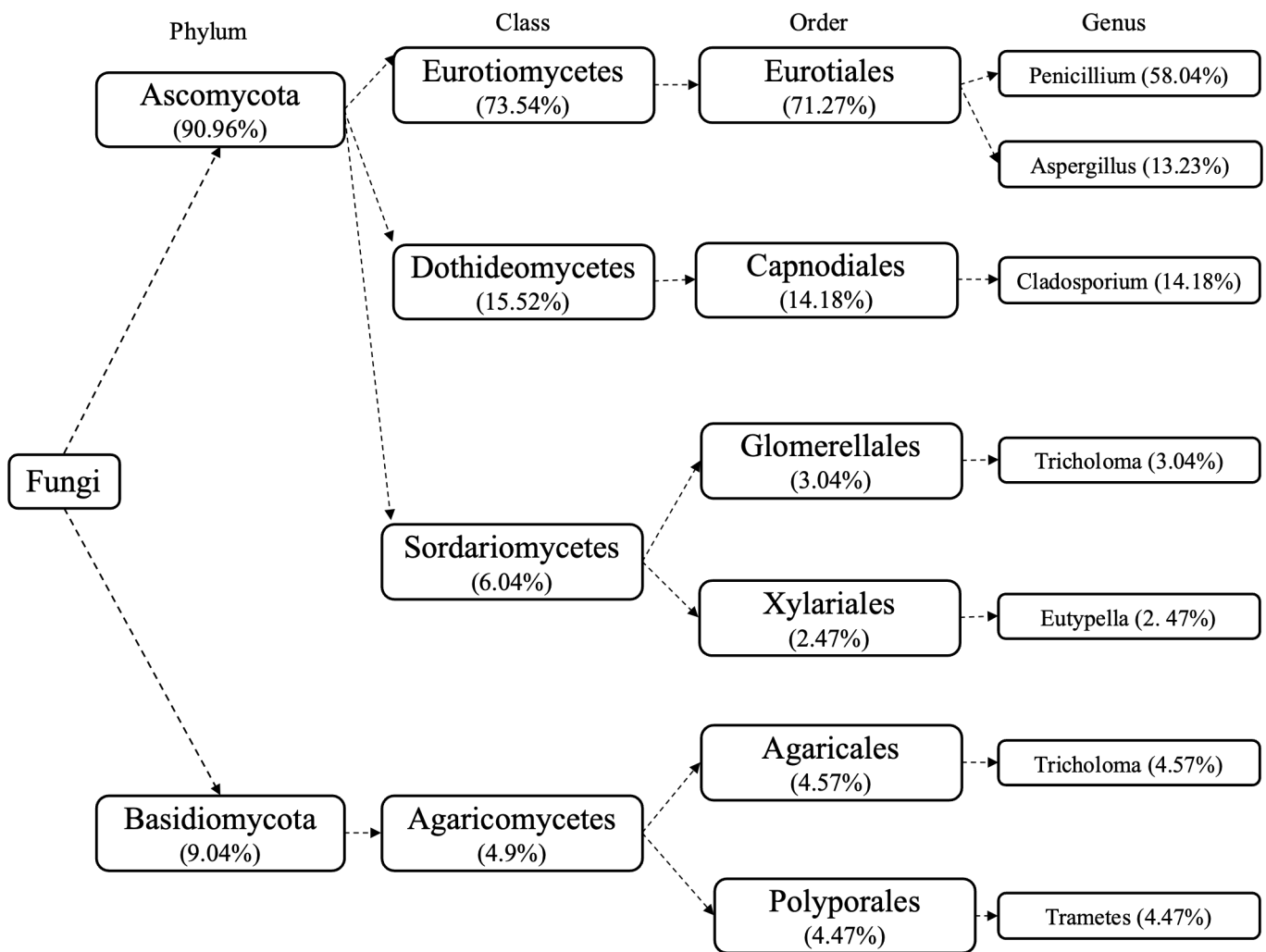


Figure S2. Taxonomic classification fungal endophytes OUT from ITS sequence sequences of endophytic fungi recovered from three representative tissues from two different locations

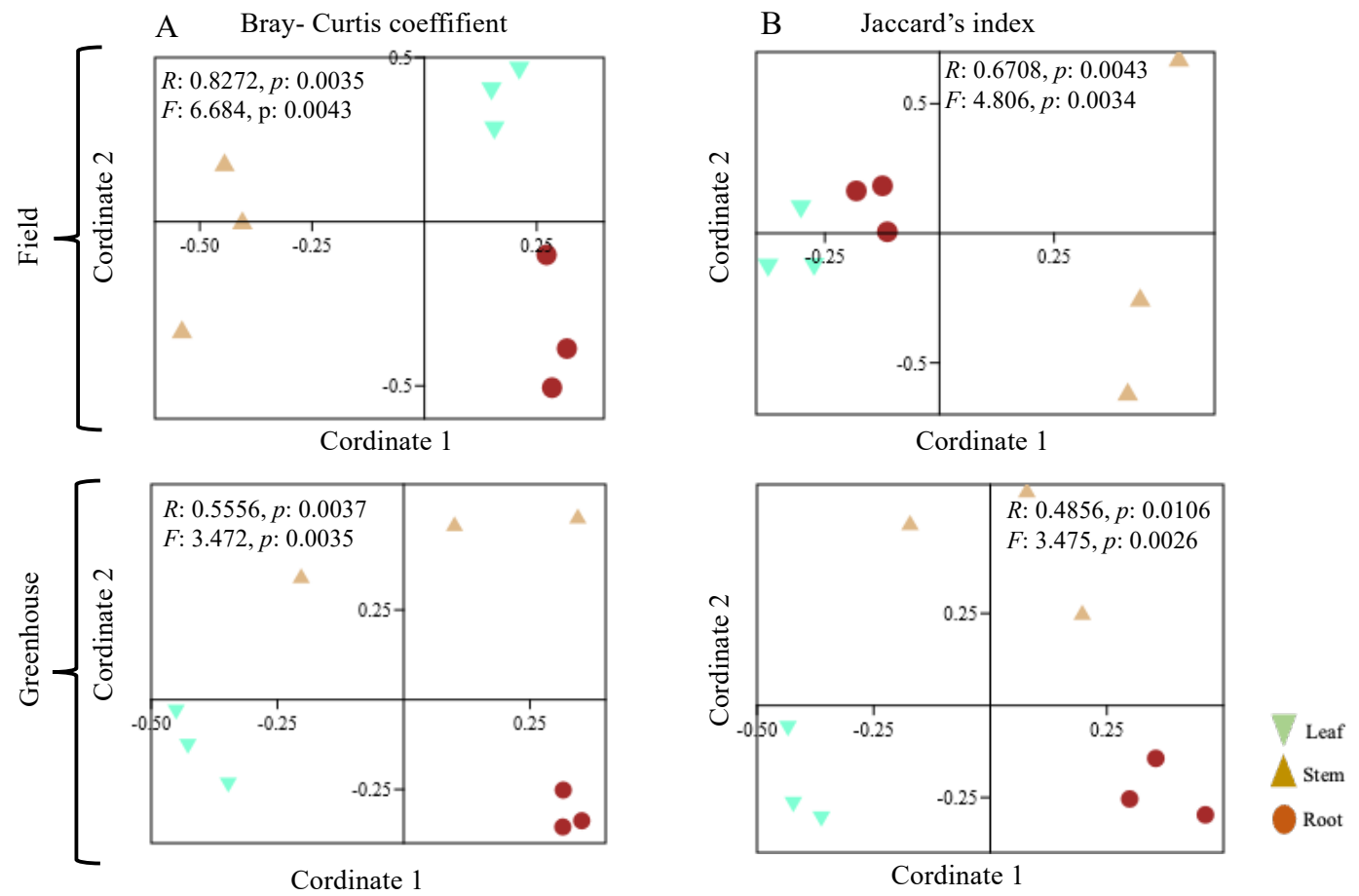


Figure S3. Fungal endophyte communities as influenced by tissue types from two environmental locations. Nonmetric multidimensional scaling (NMDS) plots for cluster analyses of the fungal endophyte community were calculated: (A) Bray–Curtis coefficient, which compares fungal taxa presence or absence along with the abundance among groups, and (B) Jaccard's index which is uses only to compute presence and absence data for comparing fungal community similarity among groups. The ANOSIM statistic R and The PERMANOVA statistic F values and the corresponding p -values indicating the significance of dissimilarity were obtained by permutation of group membership, with 9999 replicates.

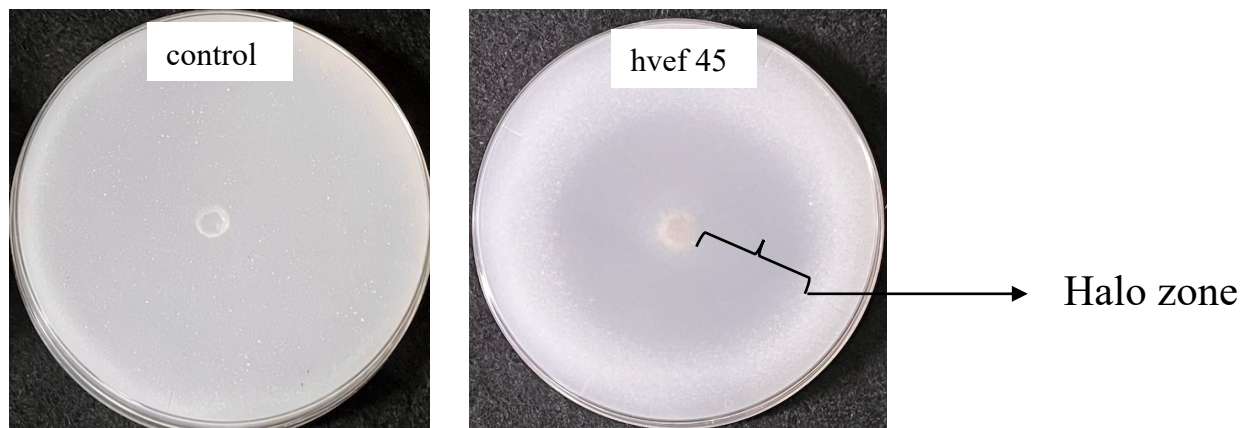


Figure S4. Potassium solubilization activity of fungal isolates.

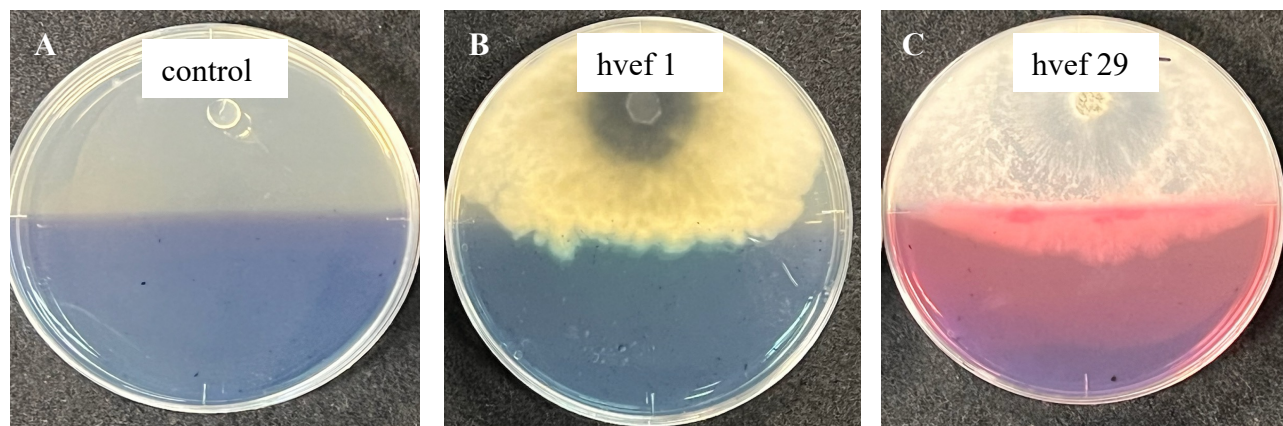


Figure S5. Identification of the siderophore producing isolate. (A)Control. (B) Not bale to produce siderophore. (C) Siderophore production activity of fungal isolate by change the blue color of CAS agar into purplish-red.

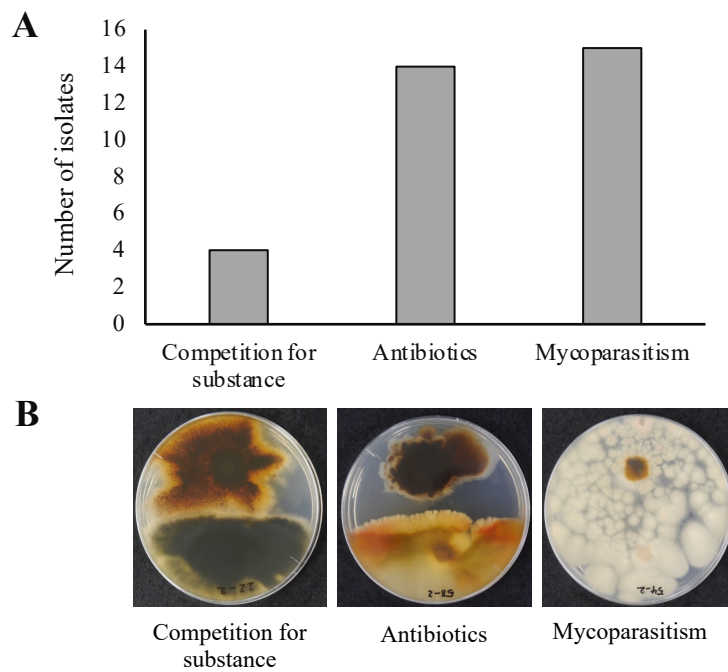


Figure S6. (A) Number of antagonistic combinations of endophytic fungi against pathogenic fungi. (B) Antagonistic types of endophytic fungi towards pathogenic fungi.