

Supplementary Material

Table S1: Orthogonal design factors and levels used to optimize a combination for enhanced effects of fungal pathogens

Factors	Level		
	1	2	3
Air temperature (A)	14 ° C	20 ° C	28 ° C
Soil moisture (B) ^a	10%	20%	30%
Carbon sources (C)	wheat bran	maltose	bio-char
Control	10% soil moisture with cap	20% soil moisture with cap	30% soil moisture with cap

^a soil moisture is the absolute water content of the soil; ^b carbon source added to add 5%(w/w) concentration.

Table S2: Effects of the soil treatments on the numbers of colony-forming units (CFU) of *Fusarium* spp. (FUS) and *Phytophthora* spp. (PHY) on selective media in soil after fumigation based on the Orthogonal design shown in Table S1

Trial No.	Factors										FUS		PHY	
	A	B	A×B(1)	A×B(2)	C	A×C(1)	A×C(2)	B×C(1)	B×C(2)	CFU/g	%	CFU/g	%	
											reduction		reduction	
1	1	1	1	1	1	1	1	1	1	2563	83.64	19437	0.00	
2	1	1	1	1	2	2	2	2	2	837	94.66	3230	81.72	
3	1	1	1	1	3	3	3	3	3	1941	87.61	8444	52.17	
4	1	2	2	2	1	1	1	2	3	1425	90.90	1683	90.48	
5	1	2	2	2	2	2	2	3	1	3517	77.55	2417	86.32	

6	1	2	2	2	3	3	3	1	2	4517	71.16	4292	75.70
7	1	3	3	3	1	1	1	3	2	0	100.00	629	96.45
8	1	3	3	3	2	2	2	1	3	3267	79.14	2552	85.55
9	1	3	3	3	3	3	3	2	1	3105	80.18	2648	85.01
10	2	1	2	3	1	2	3	1	1	8296	47.03	11681	33.83
11	2	1	2	3	2	3	1	2	2	3874	75.27	5526	68.71
12	2	1	2	3	3	1	2	3	3	15689	0.00	4785	72.90
13	2	2	3	1	1	2	3	2	3	133	99.15	1483	91.61
14	2	2	3	1	2	3	1	3	1	8	99.95	3333	81.13
15	2	2	3	1	3	1	2	1	2	3050	80.53	2583	85.38
16	2	3	1	2	1	2	3	3	2	0	100.00	0	100.00
17	2	3	1	2	2	3	1	1	3	38	99.76	0	100.00
18	2	3	1	2	3	1	2	2	1	1200	92.34	5000	71.69
19	3	1	3	2	1	3	2	1	1	830	94.70	5800	67.15
20	3	1	3	2	2	1	3	2	2	311	98.01	1807	89.77
21	3	1	3	2	3	2	1	3	3	5867	62.54	18296	0.00
22	3	2	1	3	1	3	2	2	3	0	100.00	0	100.00
23	3	2	1	3	2	1	3	3	1	17	99.89	17	99.92

24	3	2	1	3	3	2	1	1	2	3708	76.32	5667	67.91
25	3	3	2	1	1	3	2	3	2	0	100.00	10	99.96
26	3	3	2	1	2	1	3	1	3	0	100.00	0	100.00
27	3	3	2	1	3	2	1	2	1	5333	65.95	9733	44.87

Abbreviations: A =Air temperature, B=Soil moisture, C =Carbon source. In each column, the data are the means of three replications. A×B, A×C and B×C represent the interaction of A, B factors, A, C factors and B, C factors, respectively.

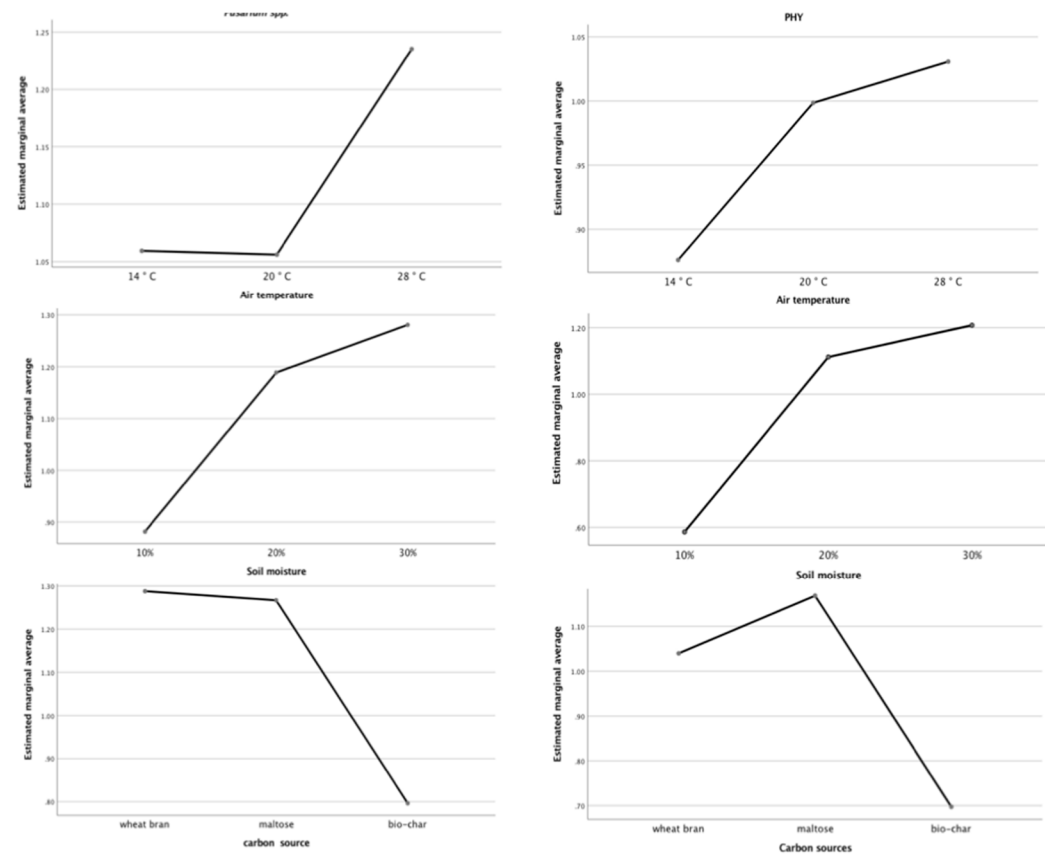


Figure S1: Influencing factor level trend chart. Trend graph of ASD control effect against *Fusarium* spp. (left) and *Phytophthora* spp. (right). with different influencing factors.

Table S 3: The effects of ASD treatments on the numbers of colony-forming units (CFU) of *Fusarium* spp. (FUS) of A×B combinations under multiple comparison test results

A×B combinations	N	Subset of Alpha = 0.05
------------------	---	------------------------

		1	2
4	3	40.77	
2	3		79.87
7	3		85.08
3	3		86.44
1	3		88.64
9	3		88.65
8	3		92.07
5	3		93.21
6	3		97.37

Abbreviations: A =Air temperature, B=Soil moisture, A1, A2 and A3 represent the air temperature 14 ° C, 20 ° C and 30° C, respectively.

B1, B2 and B3 represent the extraction method: 10% soil moisture, 20% soil moisture and 30% soil moisture, respectively.

Combination 1 is A1 × B1, Combination 2 is A1 × B2, Combination 3 is A1 × B3, Combination 4 is A2 × B1, Combination 5 is A2 × B2, Combination 6 is A2 × B3, Combination 7 is A3 × B1, Combination 8 is A3 × B2, Combination 9 is A3 × B3.