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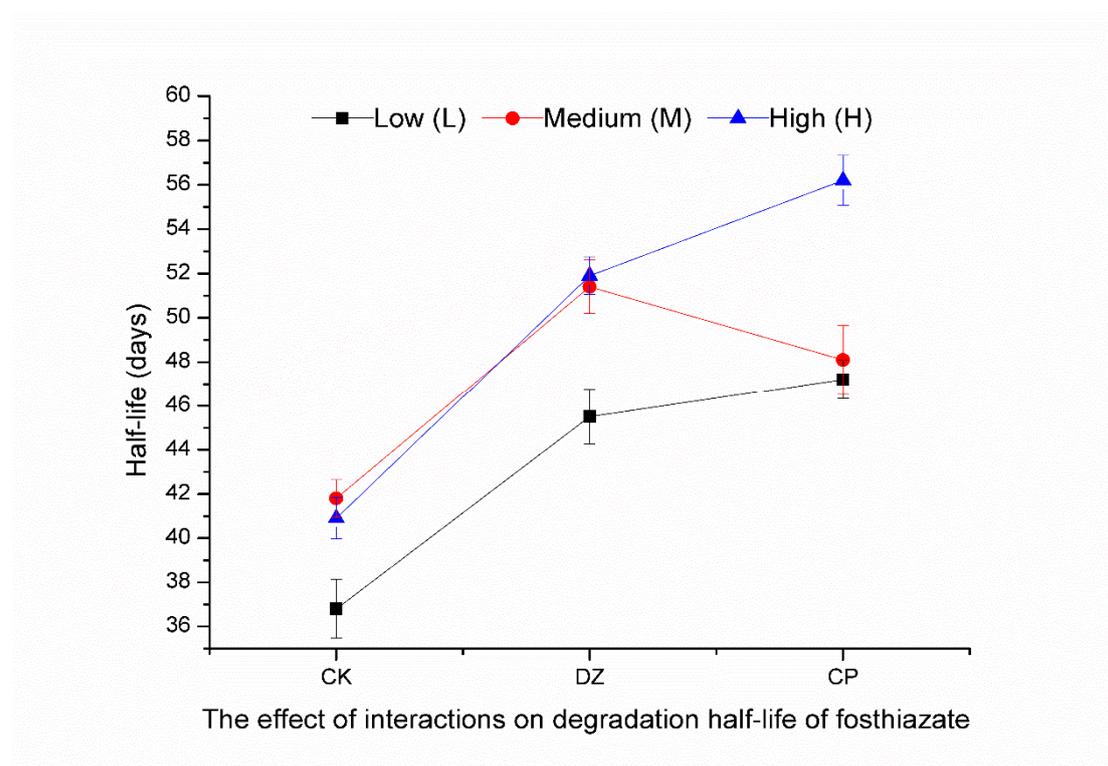
Appendix H. Tests of significance for total yield in greenhouse trials using UNIQUE sums of squares

Appendix I. Tests of significance for first yield and total income in greenhouse trials using UNIQUE sums of squares

Supporting information materials:

Appendix A The main physicochemical properties of the soil used in laboratory and greenhouse trials

Trial No.	Sand (%)	Silt (%)	Clay (%)	NH ₄ ⁺ -N (mg kg ⁻¹)	NO ₃ ⁻ -N (mg kg ⁻¹)	Available phosphorus (mg kg ⁻¹)	Organic matter (g kg ⁻¹)	pH	Water content (%)
1	12.3	64.4	23.3	35.7	56.2	315.6	33.5	6.5	17.8
2	16.7	70.5	12.8	12.5	23.8	172.6	26.1	6.9	23.6



Appendix B Half-life values for fosthiazate (low, medium or high doses) when combined with chloropicrin (CP) or dazomet (DZ) fumigants in the laboratory

Appendix C Test of between-subject effects of half-life values for dazomet and chloropicrin fumigants combined with different fosthiazate rates in the laboratory

Source of Variation	SS ^a	DF ^b	MS ^c	F	P
WITHIN RESIDUAL	70.6	18	3.92		
Fosthiazate rate	191.7	2	95.86	24.46***	0.000
Fumigant	628.7	2	314.37	80.21***	0.000
Fosthiazate rate BY Fumigant	74.8	4	18.70	4.77**	0.008
(Model)	895.3	8	111.91	28.55***	0.000

^aSS= Sum of squares, ^bDF= Degrees of freedom , ^cMS= Mean square. The significance level of the F values. (* for p<0.05, ** for p<0.01, and *** for p<0.001)

Appendix D Tests of significance between fumigants and the degradation half-life values of low, medium or high rates of fosthiazate in a laboratory study using UNIQUE sums of squares

Source of Variation	SS	DF	MS	F	P
Fumigants WITHIN Low rate (L)	186.28	2	93.14	7.10***	0.005
Fumigants WITHIN Medium rate (M)	140.63	2	70.31	5.36*	0.014
Fumigants WITHIN High rate (H)	376.65	2	188.32	14.36***	0.000
WITHIN+RESIDUAL (1)	262.27	20	13.11		
Fosthiazate rate WITHIN CK	42.60	2	21.30	0.61	0.554
Fosthiazate rate WITHIN DZ	76.02	2	38.01	1.09	0.356
Fosthiazate rate WITHIN CP	147.90	2	73.95	2.12	0.147
WITHIN+RESIDUAL (2)	699.30	20	34.97		

^aSS= Sum of squares, ^bDF= Degrees of freedom , ^cMS= Mean square. The significance level of the F values. (* for p<0.05, ** for p<0.01, and *** for p<0.001)

Appendix E Test of between-subject effects of the half-life values of fumigants, fosthiazate rate and greenhouse location in two trials

Source of Variation	SS ^a	DF ^b	MS ^c	F	P
WITHIN RESIDUAL	55.46	24	2.31		
Fosthiazate rate	9.8	1	9.82	4.25*	0.048
Fumigant	144.4	2	72.20	31.24***	0.000
Greenhouse	22.7	1	22.72	9.83**	0.004
Fosthiazate rate BY Fumigant	1.2	2	0.60	0.26	0.774
Fosthiazate rate BY Greenhouse	1.7	1	1.69	0.73	0.401
Fumigant BY Greenhouse	2.2	2	1.10	0.47	0.629
Fosthiazate rate BY Fumigant BY Greenhouse (Model)	0.6	2	0.28	0.12	0.886
	182.6	11	16.59	7.18***	0.000

^aSS= Sum of squares, ^bDF= Degrees of freedom , ^cMS= Mean square. The significance level of the F values (* for p<0.05, ** for p<0.01, and *** for p<0.001)

Appendix F Test of between-subject effects of cucumber plant height, crop yield (first

and total) and income when fosthiazate was combined with a fumigant (chloropricrin or dazomet) or used alone in greenhouse trials

Trial	Independent variable	Source of Variation	SS	DF	MS	F	P
Trial 1	Plant height	Fosthiazate rate	203.2	2	101.60	7.63**	0.004
		Fumigant	184.7	2	92.34	6.94**	0.006
		Fosthiazate rate BY Fumigant	236.0	4	59.01	4.43*	0.011
	First yield	Fosthiazate rate	0.197	2	0.10	12.38***	0.000
		Fumigant	0.088	2	0.04	5.52*	0.013
		Fosthiazate rate BY Fumigant	0.029	4	0.01	0.90	0.483
	Total yield	Fosthiazate rate	0.988	2	0.49	20.75***	0.000
		Fumigant	1.733	2	0.87	36.40***	0.000
		Fosthiazate rate BY Fumigant	0.539	4	0.14	5.65**	0.004
	Total income	Fosthiazate rate	5.646	2	2.82	16.57***	0.000
		Fumigant	11.24	2	5.62	32.97***	0.000
		Fosthiazate rate BY Fumigant	4.232	4	1.06	6.21**	0.003
Trial 2	Plant height	Fosthiazate rate	147.1	2	73.53	11.78**	0.001
		Fumigant	1015	2	507.84	81.34***	0.000
		Fosthiazate rate BY Fumigant	137.9	4	34.47	5.52**	0.004
	First yield	Fosthiazate rate	0.237	2	0.12	6.28**	0.009
		Fumigant	0.060	2	0.03	1.59	0.231
		Fosthiazate rate BY Fumigant	0.274	4	0.06	3.63*	0.024
	Total yield	Fosthiazate rate	0.540	2	0.27	13.09***	0.000
		Fumigant	1.552	2	0.78	37.63***	0.000
		Fosthiazate rate BY Fumigant	0.248	4	0.06	3.08*	0.046
	Total income	Fosthiazate rate	2.116	2	1.06	6.689**	0.007
		Fumigant	11.91	2	5.95	37.66***	0.000
		Fosthiazate rate BY Fumigant	0.691	4	0.17	1.092	0.390

^aSS= Sum of squares, ^bDF= Degrees of freedom, ^cMS= Mean square. The significance level of the F values. (* for p<0.05, ** for p<0.01, and *** for p<0.001)

Appendix G Tests of significance for plant height in greenhouse trials using UNIQUE

sums of squares

Trials		Source of Variation	SS	DF	MS	F	P
Plant height in Trial 1	Fumigants WITHIN CK ₂		131.70	2	65.85	2.97	0.074
	Fumigants WITHIN Low rate (L)		241.95	2	120.97	5.46*	0.013
	Fumigants WITHIN Medium rate (M)		47.08	2	23.54	1.06	0.364
	WITHIN+RESIDUAL (1)		442.84	20	22.14		
	Fosthiazate rate WITHIN CK ₁		181.71	2	90.85	4.28*	0.028
	Fosthiazate rate WITHIN DZ		29.74	2	14.87	0.70	0.508
	Fosthiazate rate WITHIN CP		227.81	2	113.90	5.37*	0.014
	WITHIN+RESIDUAL (2)		424.31	20	21.22		
Plant height in Trial 2	Fumigants WITHIN CK ₂		418.06	2	209.03	16.11***	0.000
	Fumigants WITHIN Low rate (L)		600.78	2	300.39	23.16***	0.000
	Fumigants WITHIN Medium rate (M)		134.75	2	67.38	5.19*	0.015
	WITHIN+RESIDUAL (1)		259.44	20	12.97		
	Fosthiazate rate WITHIN CK ₁		147.63	2	73.81	1.31	0.292
	Fosthiazate rate WITHIN DZ		69.63	2	34.81	0.62	0.549
	Fosthiazate rate WITHIN CP		67.71	2	33.86	0.60	0.558
	WITHIN+RESIDUAL (2)		147.63	20	56.40		

^aSS= Sum of squares, ^bDF= Degrees of freedom, ^cMS= Mean square. The significance level of the F values. (* for p<0.05, ** for p<0.01, and *** for p<0.001). CK = control; DZ = dazomet; CP = chloropicrin

Appendix H Tests of significance for total yield in greenhouse trials using UNIQUE sums of squares

Trial	Source of Variation	SS	DF	MS	F	P
Total yield in	Fumigants WITHIN CK ₂	0.87	2	0.44	6.15**	0.008
Trial 1	Fumigants WITHIN Low rate (L)	0.98	2	0.49	6.89**	0.005
	Fumigants WITHIN Medium rate (M)	0.42	2	0.21	2.99	0.073
	WITHIN+RESIDUAL (1)	1.42	20	0.07		
	Fosthiazate rate WITHIN CK ₁	0.86	2	0.43	3.96*	0.036
	Fosthiazate rate WITHIN DZ	0.07	2	0.04	0.33	0.725
	Fosthiazate rate WITHIN CP	0.60	2	0.30	2.78	0.086
	WITHIN+RESIDUAL (2)	2.16	20	0.11		
Total yield in	Fumigants WITHIN CK ₂	0.55	2	0.28	6.06**	0.009
Trial 2	Fumigants WITHIN Low rate (L)	0.92	2	0.46	10.09**	0.001
	Fumigants WITHIN Medium rate (M)	0.33	2	0.16	3.62*	0.046
	WITHIN+RESIDUAL (1)	0.91	20	0.05		
	Fosthiazate rate WITHIN CK ₁	0.35	2	0.18	1.83	0.186
	Fosthiazate rate WITHIN DZ	0.13	2	0.06	0.65	0.531
	Fosthiazate rate WITHIN CP	0.31	2	0.15	1.61	0.225
	WITHIN+RESIDUAL (2)	1.92	20	0.10		

^aSS= Sum of squares, ^bDF= Degrees of freedom, ^cMS= Mean square. The significance level of the F values. (* for p<0.05, ** for p<0.01, and *** for p<0.001). CK = control; DZ = dazomet; CP = chloropicrin.

Appendix I Tests of significance for first yield and total income in greenhouse trials using UNIQUE sums of squares

Trial	Source of Variation	SS	DF	MS	F	P
Total income in Trial 1	Fumigants WITHIN CK ₂	5.87	2	2.94	6.74**	0.006
	Fumigants WITHIN Low rate (L)	7.21	2	3.60	8.27**	0.002
	Fumigants WITHIN Medium rate (M)	2.39	2	1.20	2.74	0.089
	WITHIN+RESIDUAL (1)	8.71	20	0.44		
	Fosthiazate rate WITHIN CK ₁	6.09	2	3.04	4.25*	0.029
	Fosthiazate rate WITHIN DZ	0.60	2	0.30	0.42	0.663
	Fosthiazate rate WITHIN CP	3.19	2	1.60	2.23	0.133
	WITHIN+RESIDUAL (2)	14.31	20	0.72		
First yield in Trial 2	Fumigants WITHIN CK ₂	0.07	2	0.03	1.14	0.340
	Fumigants WITHIN Low rate (L)	0.03	2	0.02	0.57	0.572
	Fumigants WITHIN Medium rate (M)	0.23	2	0.12	4.08*	0.033
	WITHIN+RESIDUAL (1)	0.58	20	0.03		
	Fosthiazate rate WITHIN CK ₁	0.08	2	0.04	1.93	0.171
	Fosthiazate rate WITHIN DZ	0.01	2	0.01	0.28	0.755
	Fosthiazate rate WITHIN CP	0.42	2	0.21	10.58**	0.001
	WITHIN+RESIDUAL (2)	0.40	20	0.02		

^aSS= Sum of squares, ^bDF= Degrees of freedom, ^cMS= Mean square. The significance level of the F values. (* for p<0.05, ** for p<0.01, and *** for p<0.001). CK = control; DZ = dazomet; CP = chloropicrin.