IJM – Italian Journal of Mycology, Vol. 53 (2024): 110-116

https://doi.org/10.6092/issn.2531-7342/19222

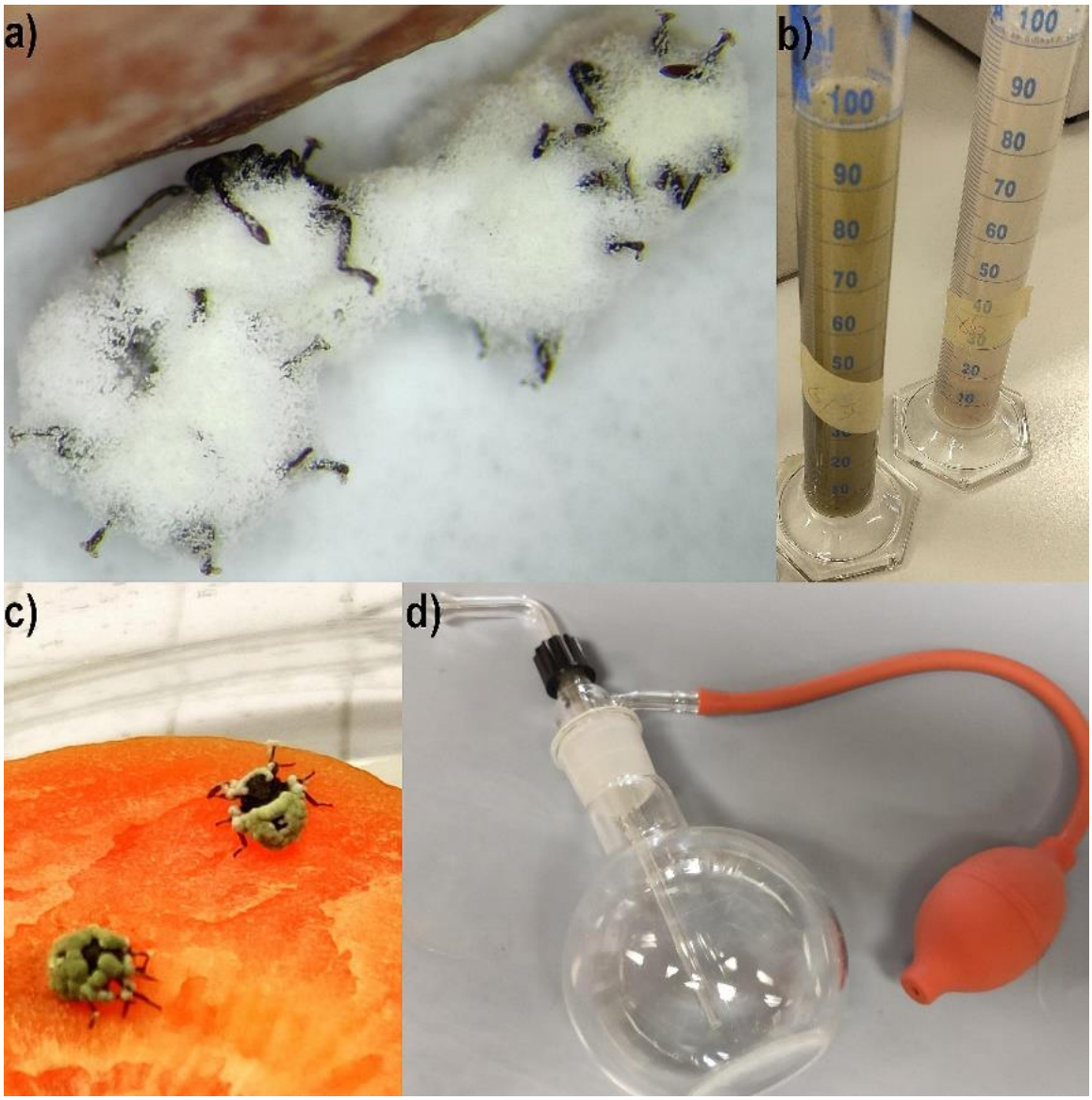
Supplementary material

Larvicidal activity of different entomopathogenic fungi on *Halyomorpha halys* (Heteroptera: Pentatomidae) under laboratory conditions

Martin Parth, Angelika Gruber, Manfred Wolf

Laimburg Research Centre, Institute for Plant Health, 39040 Auer/Ora, BZ, Italy

Corresponding author e-mail: martin.parth@laimburg.it



Supplementary Fig. S1 - a) fungal growth and sporulation on first instar nymphs after BOTANIGARD® OD treatment; b) *Metarhizium brunneum* and *Beauveria bassiana* conidia suspensions; Growth and sporulation of *M. brunneum* GT7 on first instar nymphs; d) TLC reagent sprayer.

Continuous Table 1 - complete raw data.

Date of treatment	Target	Egg mass label	Treatment	Experiment	No. eggs / egg mass	Hatched eggs	No. of individuals / developement stage					Cumulative mortality [%]						
							N2	N3	N4	N5	adult	Egg to N1	Egg to N2	Egg to N3	Egg to N4	Egg to N5	Egg to adult	N1 to adult
17.11.21	*H. halys egg mass*	BOT1	Botanigard® OD 2 mL/L	*A*	28	20	13	6	2	2	2	28.6	53.6	78.6	92.9	92.9	92.9	90.0
17.11.21	*H. halys egg mass*	BOT2	Botanigard® OD 2 mL/L	*A*	27	23	8	1	0	0	0	14.8	70.4	96.3	100.0	100.0	100.0	100.0
17.11.21	*H. halys egg mass*	BOT3	Botanigard® OD 2 mL/L	*A*	22	19	16	10	7	6	6	13.6	27.3	54.5	68.2	72.7	72.7	68.4
17.11.21	*H. halys egg mass*	BOT4	Botanigard® OD 2 mL/L	*A*	28	27	19	14	11	10	9	3.6	32.1	50.0	60.7	64.3	67.9	66.7
17.11.21	*H. halys egg mass*	BOT5	Botanigard® OD 2 mL/L	*A*	27	26	0	0	0	0	0	3.7	100.0	100.0	100.0	100.0	100.0	100.0
17.11.21	*H. halys egg mass*	BOT6	Botanigard® OD 2 mL/L	*A*	22	22	8	3	2	2	2	0.0	63.6	86.4	90.9	90.9	90.9	90.9
17.11.21	*H. halys egg mass*	K1	Control	*A*	27	26	19	18	17	16	14	3.7	29.6	33.3	37.0	40.7	48.1	46.2
17.11.21	*H. halys egg mass*	K2	Control	*A*	28	26	24	23	23	22	19	7.1	14.3	17.9	17.9	21.4	32.1	26.9
17.11.21	*H. halys egg mass*	K3	Control	*A*	28	24	24	20	17	10	7	14.3	14.3	28.6	39.3	64.3	75.0	70.8
17.11.21	*H. halys egg mass*	K4	Control	*A*	34	33	33	31	29	25	17	2.9	2.9	8.8	14.7	26.5	50.0	48.5
17.11.21	*H. halys egg mass*	K5	Control	*A*	28	0	0	0	0	0	0	100.0	100.0	100.0	100.0	100.0	100.0	N.a.
17.11.21	*H. halys egg mass*	K6	Control	*A*	28	28	28	27	21	11	6	0.0	0.0	3.6	25.0	60.7	78.6	78.6
07.12.21	*H. halys egg mass*	BOT1	Botanigard® OD 2 mL/L	*B*	25	23	3	0	0	0	0	8.0	88.0	100.0	100.0	100.0	100.0	100.0
07.12.21	*H. halys egg mass*	BOT2	Botanigard® OD 2 mL/L	*B*	26	14	0	0	0	0	0	46.2	100.0	100.0	100.0	100.0	100.0	100.0
07.12.21	*H. halys egg mass*	BOT3	Botanigard® OD 2 mL/L	*B*	20	16	0	0	0	0	0	20.0	100.0	100.0	100.0	100.0	100.0	100.0
07.12.21	*H. halys egg mass*	BOT4	Botanigard® OD 2 mL/L	*B*	26	19	0	0	0	0	0	26.9	100.0	100.0	100.0	100.0	100.0	100.0
07.12.21	*H. halys egg mass*	BOT5	Botanigard® OD 2 mL/L	*B*	21	20	10	2	2	2	2	4.8	52.4	90.5	90.5	90.5	90.5	90.0
07.12.21	*H. halys egg mass*	BOT6	Botanigard® OD 2 mL/L	*B*	28	24	0	0	0	0	0	14.3	100.0	100.0	100.0	100.0	100.0	100.0
07.12.21	*H. halys egg mass*	K1	Control	*B*	27	19	17	17	10	10	6	29.6	37.0	37.0	63.0	63.0	77.8	68.4
07.12.21	*H. halys egg mass*	K2	Control	*B*	28	21	17	15	8	8	4	25.0	39.3	46.4	71.4	71.4	85.7	81.0
07.12.21	*H. halys egg mass*	K3	Control	*B*	22	17	16	14	13	13	8	22.7	27.3	36.4	40.9	40.9	63.6	52.9
07.12.21	*H. halys egg mass*	K4	Control	*B*	27	18	17	15	11	10	9	33.3	37.0	44.4	59.3	63.0	66.7	50.0
07.12.21	*H. halys egg mass*	K5	Control	*B*	28	27	24	16	13	10	6	3.6	14.3	42.9	53.6	64.3	78.6	77.8
07.12.21	*H. halys egg mass*	K6	Control	*B*	23	23	19	18	14	14	13	0.0	17.4	21.7	39.1	39.1	43.5	43.5

Date of treatment	Target	Egg mass label	Treatment	Experiment	No. eggs / egg mass	Hatched eggs	No. of individuals / developement stage					Cumulative mortality [%]						
							N2	N3	N4	N5	adult	Egg to N1	Egg to N2	Egg to N3	Egg to N4	Egg to N5	Egg to adult	N1 to adult
21.12.21	*H. halys egg mass*	BOT1	Botanigard® OD 2 mL/L	*C*	26	20	11	4	2	1	1	23.1	57.7	84.6	92.3	96.2	96.2	95.0
21.12.21	*H. halys egg mass*	BOT2	Botanigard® OD 2 mL/L	*C*	25	21	3	0	0	0	0	16.0	88.0	100.0	100.0	100.0	100.0	100.0
21.12.21	*H. halys egg mass*	BOT3	Botanigard® OD 2 mL/L	*C*	23	18	10	3	1	1	1	21.7	56.5	87.0	95.7	95.7	95.7	94.4
21.12.21	*H. halys egg mass*	BOT4	Botanigard® OD 2 mL/L	*C*	25	16	15	1	0	0	0	36.0	40.0	96.0	100.0	100.0	100.0	100.0
21.12.21	*H. halys egg mass*	BOT5	Botanigard® OD 2 mL/L	*C*	16	14	5	1	1	1	1	12.5	68.8	93.8	93.8	93.8	93.8	92.9
21.12.21	*H. halys egg mass*	BOT6	Botanigard® OD 2 mL/L	*C*	12	11	0	0	0	0	0	8.3	100.0	100.0	100.0	100.0	100.0	100.0
21.12.21	*H. halys egg mass*	K1	Control	*C*	36	32	32	31	26	26	18	11.1	11.1	13.9	27.8	27.8	50.0	43.8
21.12.21	*H. halys egg mass*	K2	Control	*C*	21	15	11	10	8	7	7	28.6	47.6	52.4	61.9	66.7	66.7	53.3
21.12.21	*H. halys egg mass*	K3	Control	*C*	14	11	9	3	0	0	0	21.4	35.7	78.6	100.0	100.0	100.0	100.0
21.12.21	*H. halys egg mass*	K4	Control	*C*	27	18	17	17	8	7	3	33.3	37.0	37.0	70.4	74.1	88.9	83.3
21.12.21	*H. halys egg mass*	K5	Control	*C*	17	14	14	11	7	5	5	17.6	17.6	35.3	58.8	70.6	70.6	64.3
21.12.21	*H. halys egg mass*	K6	Control	*C*	16	10	10	10	9	9	8	37.5	37.5	37.5	43.8	43.8	50.0	20.0
27.07.22	*H. halys egg mass*	AWLB1	*B. bassiana* AWLB	*D*	28	22	0	0	0	0	0	21.4	100.0	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	AWLB2	*B. bassiana* AWLB	*D*	23	6	1	0	0	0	0	73.9	95.7	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	AWLB3	*B. bassiana* AWLB	*D*	21	16	0	0	0	0	0	23.8	100.0	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	AWLB4	*B. bassiana* AWLB	*D*	55	28	7	0	0	0	0	49.1	87.3	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	AWLB5	*B. bassiana* AWLB	*D*	14	14	0	0	0	0	0	0.0	100.0	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	AWLB6	*B. bassiana* AWLB	*D*	27	23	0	0	0	0	0	14.8	100.0	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	K1	Control	*D*	28	25	25	16	0	0	0	10.7	10.7	42.9	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	K2	Control	*D*	21	21	21	20	16	16	16	0.0	0.0	4.8	23.8	23.8	23.8	23.8
27.07.22	*H. halys egg mass*	K3	Control	*D*	25	24	24	18	18	18	18	4.0	4.0	28.0	28.0	28.0	28.0	25.0
27.07.22	*H. halys egg mass*	K4	Control	*D*	26	24	23	20	20	20	0	7.7	11.5	23.1	23.1	23.1	100.0	100.0
27.07.22	*H. halys egg mass*	K5	Control	*D*	26	22	22	21	21	21	21	15.4	15.4	19.2	19.2	19.2	19.2	4.5
27.07.22	*H. halys egg mass*	K6	Control	*D*	26	25	24	19	19	19	19	3.8	7.7	26.9	26.9	26.9	26.9	24.0
27.07.22	*H. halys egg mass*	GT10_1	*M. robertsii* GT10	*D*	21	21	2	0	0	0	0	0.0	90.5	100.0	100.0	100.0	100.0	100.0

Date of treatment	Target	Egg mass label	Treatment	Experiment	No. eggs / egg mass	Hatched eggs	No. of individuals / developement stage					Cumulative mortality [%]						
							N2	N3	N4	N5	adult	Egg to N1	Egg to N2	Egg to N3	Egg to N4	Egg to N5	Egg to adult	N1 to adult
27.07.22	*H. halys egg mass*	GT10_2	*M. robertsii* GT10	*D*	23	12	0	0	0	0	0	47.8	100.0	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	GT10_3	*M. robertsii* GT10	*D*	27	24	2	0	0	0	0	11.1	92.6	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	GT10_4	*M. robertsii* GT10	*D*	18	15	0	0	0	0	0	16.7	100.0	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	GT10_5	*M. robertsii* GT10	*D*	11	11	0	0	0	0	0	0.0	100.0	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	GT10_6	*M. robertsii* GT10	*D*	29	25	7	0	0	0	0	13.8	75.9	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	GT7_1	*M. brunneum* GT7	*D*	25	19	2	0	0	0	0	24.0	92.0	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	GT7_2	*M. brunneum* GT7	*D*	28	19	6	0	0	0	0	32.1	78.6	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	GT7_3	*M. brunneum* GT7	*D*	25	23	0	0	0	0	0	8.0	100.0	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	GT7_4	*M. brunneum* GT7	*D*	28	23	2	0	0	0	0	17.9	92.9	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	GT7_5	*M. brunneum* GT7	*D*	18	15	0	0	0	0	0	16.7	100.0	100.0	100.0	100.0	100.0	100.0
27.07.22	*H. halys egg mass*	GT7_6	*M. brunneum* GT7	*D*	27	11	0	0	0	0	0	59.3	100.0	100.0	100.0	100.0	100.0	100.0
18.08.22	*H. halys egg mass*	AWLB1	*B. bassiana* AWLB	*E*	29	25	0	0	0	0	0	13.8	100.0	100.0	100.0	100.0	100.0	100.0
18.08.22	*H. halys egg mass*	AWLB2	*B. bassiana* AWLB	*E*	27	27	0	0	0	0	0	0.0	100.0	100.0	100.0	100.0	100.0	100.0
18.08.22	*H. halys egg mass*	AWLB3	*B. bassiana* AWLB	*E*	23	21	0	0	0	0	0	8.7	100.0	100.0	100.0	100.0	100.0	100.0
18.08.22	*H. halys egg mass*	AWLB4	*B. bassiana* AWLB	*E*	15	15	1	1	1	1	1	0.0	93.3	93.3	93.3	93.3	93.3	93.3
18.08.22	*H. halys egg mass*	AWLB5	*B. bassiana* AWLB	*E*	20	19	0	0	0	0	0	5.0	100.0	100.0	100.0	100.0	100.0	100.0
18.08.22	*H. halys egg mass*	AWLB6	*B. bassiana* AWLB	*E*	25	13	2	2	2	2	2	48.0	92.0	92.0	92.0	92.0	92.0	84.6
18.08.22	*H. halys egg mass*	K1	Control	*E*	27	27	27	25	25	25	25	0.0	0.0	7.4	7.4	7.4	7.4	7.4
18.08.22	*H. halys egg mass*	K2	Control	*E*	28	16	16	16	16	16	16	42.9	42.9	42.9	42.9	42.9	42.9	0.0
18.08.22	*H. halys egg mass*	K3	Control	*E*	17	16	16	15	15	15	15	5.9	5.9	11.8	11.8	11.8	11.8	6.3
18.08.22	*H. halys egg mass*	K4	Control	*E*	25	23	23	22	22	22	22	8.0	8.0	12.0	12.0	12.0	12.0	4.3
18.08.22	*H. halys egg mass*	K5	Control	*E*	29	28	25	25	25	25	25	3.4	13.8	13.8	13.8	13.8	13.8	10.7
18.08.22	*H. halys egg mass*	K6	Control	*E*	27	25	25	25	25	25	25	7.4	7.4	7.4	7.4	7.4	7.4	0.0
18.08.22	*H. halys egg mass*	GT10_1	*M. robertsii* GT10	*E*	20	18	3	1	1	1	1	10.0	85.0	95.0	95.0	95.0	95.0	94.4
18.08.22	*H. halys egg mass*	GT10_2	*M. robertsii* GT10	*E*	28	24	0	0	0	0	0	14.3	100.0	100.0	100.0	100.0	100.0	100.0

Date of treatment	Target	Egg mass label	Treatment	Experiment	No. eggs / egg mass	Hatched eggs	No. of individuals / developement stage					Cumulative mortality [%]						
							N2	N3	N4	N5	adult	Egg to N1	Egg to N2	Egg to N3	Egg to N4	Egg to N5	Egg to adult	N1 to adult
18.08.22	*H. halys egg mass*	GT10_3	*M. robertsii* GT10	*E*	28	28	1	0	0	0	0	0.0	96.4	100.0	100.0	100.0	100.0	100.0
18.08.22	*H. halys egg mass*	GT10_4	*M. robertsii* GT10	*E*	19	17	0	0	0	0	0	10.5	100.0	100.0	100.0	100.0	100.0	100.0
18.08.22	*H. halys egg mass*	GT10_5	*M. robertsii* GT10	*E*	27	27	0	0	0	0	0	0.0	100.0	100.0	100.0	100.0	100.0	100.0
18.08.22	*H. halys egg mass*	GT10_6	*M. robertsii* GT10	*E*	27	22	1	0	0	0	0	18.5	96.3	100.0	100.0	100.0	100.0	100.0
21.09.22	*H. halys egg mass*	AWLB1	*B. bassiana* AWLB	*F*	26	14	11	3	3	3	3	46.2	57.7	88.5	88.5	88.5	88.5	78.6
21.09.22	*H. halys egg mass*	AWLB2	*B. bassiana* AWLB	*F*	31	31	0	0	0	0	0	0.0	100.0	100.0	100.0	100.0	100.0	100.0
21.09.22	*H. halys egg mass*	AWLB3	*B. bassiana* AWLB	*F*	26	25	8	7	3	3	3	3.8	69.2	73.1	88.5	88.5	88.5	88.0
21.09.22	*H. halys egg mass*	AWLB4	*B. bassiana* AWLB	*F*	28	25	0	0	0	0	0	10.7	100.0	100.0	100.0	100.0	100.0	100.0
21.09.22	*H. halys egg mass*	AWLB5	*B. bassiana* AWLB	*F*	26	23	0	0	0	0	0	11.5	100.0	100.0	100.0	100.0	100.0	100.0
21.09.22	*H. halys egg mass*	AWLB6	*B. bassiana* AWLB	*F*	27	25	0	0	0	0	0	7.4	100.0	100.0	100.0	100.0	100.0	100.0
21.09.22	*H. halys egg mass*	K1	Control	*F*	24	23	20	17	16	16	16	4.2	16.7	29.2	33.3	33.3	33.3	30.4
21.09.22	*H. halys egg mass*	K2	Control	*F*	22	19	17	17	17	17	16	13.6	22.7	22.7	22.7	22.7	27.3	15.8
21.09.22	*H. halys egg mass*	K3	Control	*F*	29	27	26	26	23	23	23	6.9	10.3	10.3	20.7	20.7	20.7	14.8
21.09.22	*H. halys egg mass*	K4	Control	*F*	21	17	17	16	13	13	13	19.0	19.0	23.8	38.1	38.1	38.1	23.5
21.09.22	*H. halys egg mass*	K5	Control	*F*	23	23	23	21	20	20	20	0.0	0.0	8.7	13.0	13.0	13.0	13.0
21.09.22	*H. halys egg mass*	K6	Control	*F*	15	11	11	11	11	11	11	26.7	26.7	26.7	26.7	26.7	26.7	0.0
21.09.22	*H. halys egg mass*	GT10_1	*M. robertsii* GT10	*F*	28	22	0	0	0	0	0	21.4	100.0	100.0	100.0	100.0	100.0	100.0
21.09.22	*H. halys egg mass*	GT10_2	*M. robertsii* GT10	*F*	28	24	2	0	0	0	0	14.3	92.9	100.0	100.0	100.0	100.0	100.0
21.09.22	*H. halys egg mass*	GT10_3	*M. robertsii* GT10	*F*	28	27	3	0	0	0	0	3.6	89.3	100.0	100.0	100.0	100.0	100.0
21.09.22	*H. halys egg mass*	GT10_4	*M. robertsii* GT10	*F*	28	26	16	5	4	4	4	7.1	42.9	82.1	85.7	85.7	85.7	84.6
21.09.22	*H. halys egg mass*	GT10_5	*M. robertsii* GT10	*F*	20	19	0	0	0	0	0	5.0	100.0	100.0	100.0	100.0	100.0	100.0
21.09.22	*H. halys egg mass*	GT10_6	*M. robertsii* GT10	*F*	22	17	0	0	0	0	0	22.7	100.0	100.0	100.0	100.0	100.0	100.0
24.10.22	*H. halys egg mass*	XG_1	*B. bassiana* XG/2B	*G*	19	19	2	1	1	1	1	0.0	89.5	94.7	94.7	94.7	94.7	94.7
24.10.22	*H. halys egg mass*	XG_2	*B. bassiana* XG/2B	*G*	27	20	0	0	0	0	0	25.9	100.0	100.0	100.0	100.0	100.0	100.0
24.10.22	*H. halys egg mass*	XG_3	*B. bassiana* XG/2B	*G*	19	19	0	0	0	0	0	0.0	100.0	100.0	100.0	100.0	100.0	100.0

Date of treatment	Target	Egg mass label	Treatment	Experiment	No. eggs / egg mass	Hatched eggs	No. of individuals / developement stage					Cumulative mortality [%]						
							N2	N3	N4	N5	adult	Egg to N1	Egg to N2	Egg to N3	Egg to N4	Egg to N5	Egg to adult	N1 to adult
24.10.22	*H. halys egg mass*	XG_4	*B. bassiana* XG/2B	*G*	28	27	20	14	14	14	14	3.6	28.6	50.0	50.0	50.0	50.0	48.1
24.10.22	*H. halys egg mass*	XG_5	*B. bassiana* XG/2B	*G*	26	24	17	11	10	9	8	7.7	34.6	57.7	61.5	65.4	69.2	66.7
24.10.22	*H. halys egg mass*	XG_6	*B. bassiana* XG/2B	*G*	21	18	0	0	0	0	0	14.3	100.0	100.0	100.0	100.0	100.0	100.0
24.10.22	*H. halys egg mass*	K1	Control	*G*	22	14	11	11	9	7	7	36.4	50.0	50.0	59.1	68.2	68.2	50.0
24.10.22	*H. halys egg mass*	K2	Control	*G*	24	21	18	17	17	16	16	12.5	25.0	29.2	29.2	33.3	33.3	23.8
24.10.22	*H. halys egg mass*	K3	Control	*G*	26	24	16	4	4	4	4	7.7	38.5	84.6	84.6	84.6	84.6	83.3
24.10.22	*H. halys egg mass*	K4	Control	*G*	29	26	26	26	19	16	12	10.3	10.3	10.3	34.5	44.8	58.6	53.8
24.10.22	*H. halys egg mass*	K5	Control	*G*	28	26	26	26	21	20	18	7.1	7.1	7.1	25.0	28.6	35.7	30.8
24.10.22	*H. halys egg mass*	K6	Control	*G*	27	27	27	26	22	20	18	0.0	0.0	3.7	18.5	25.9	33.3	33.3
24.10.22	*H. halys egg mass*	BP5_1	*M. brunneum* BIPESCO 5	*G*	21	12	7	1	1	1	1	42.9	66.7	95.2	95.2	95.2	95.2	91.7
24.10.22	*H. halys egg mass*	BP5_2	*M. brunneum* BIPESCO 5	*G*	27	0	0	0	0	0	0	100.0	100.0	100.0	100.0	100.0	100.0	N.a.
24.10.22	*H. halys egg mass*	BP5_3	*M. brunneum* BIPESCO 5	*G*	23	20	12	0	0	0	0	13.0	47.8	100.0	100.0	100.0	100.0	100.0
24.10.22	*H. halys egg mass*	BP5_4	*M. brunneum* BIPESCO 5	*G*	25	9	0	0	0	0	0	64.0	100.0	100.0	100.0	100.0	100.0	100.0
24.10.22	*H. halys egg mass*	BP5_5	*M. brunneum* BIPESCO 5	*G*	27	21	0	0	0	0	0	22.2	100.0	100.0	100.0	100.0	100.0	100.0
24.10.22	*H. halys egg mass*	BP5_6	*M. brunneum* BIPESCO 5	*G*	28	21	10	3	1	0	0	25.0	64.3	89.3	96.4	100.0	100.0	100.0
24.10.22	*H. halys egg mass*	GT7_1	*M. brunneum* GT7	*G*	28	24	10	0	0	0	0	14.3	64.3	100.0	100.0	100.0	100.0	100.0
24.10.22	*H. halys egg mass*	GT7_2	*M. brunneum* GT7	*G*	26	18	0	0	0	0	0	30.8	100.0	100.0	100.0	100.0	100.0	100.0
24.10.22	*H. halys egg mass*	GT7_3	*M. brunneum* GT7	*G*	28	25	3	0	0	0	0	10.7	89.3	100.0	100.0	100.0	100.0	100.0
24.10.22	*H. halys egg mass*	GT7_4	*M. brunneum* GT7	*G*	26	18	15	0	0	0	0	30.8	42.3	100.0	100.0	100.0	100.0	100.0
24.10.22	*H. halys egg mass*	GT7_5	*M. brunneum* GT7	*G*	26	25	0	0	0	0	0	3.8	100.0	100.0	100.0	100.0	100.0	100.0
24.10.22	*H. halys egg mass*	GT7_6	*M. brunneum* GT7	*G*	26	0	0	0	0	0	0	100.0	100.0	100.0	100.0	100.0	100.0	N.a.
28.10.22	*H. halys egg mass*	XG_1	*B. bassiana* XG/2B	*H*	10	7	0	0	0	0	0	30.0	100.0	100.0	100.0	100.0	100.0	100.0
28.10.22	*H. halys egg mass*	XG_2	*B. bassiana* XG/2B	*H*	24	23	4	2	2	2	2	4.2	83.3	91.7	91.7	91.7	91.7	91.3
28.10.22	*H. halys egg mass*	XG_3	*B. bassiana* XG/2B	*H*	28	28	0	0	0	0	0	0.0	100.0	100.0	100.0	100.0	100.0	100.0
28.10.22	*H. halys egg mass*	XG_4	*B. bassiana* XG/2B	*H*	21	11	0	0	0	0	0	47.6	100.0	100.0	100.0	100.0	100.0	100.0

Date of treatment	Target	Egg mass label	Treatment	Experiment	No. eggs / egg mass	Hatched eggs	No. of individuals / developement stage					Cumulative mortality [%]						
							N2	N3	N4	N5	adult	Egg to N1	Egg to N2	Egg to N3	Egg to N4	Egg to N5	Egg to adult	N1 to adult
28.10.22	*H. halys egg mass*	XG_5	*B. bassiana* XG/2B	*H*	25	24	14	11	11	11	10	4.0	44.0	56.0	56.0	56.0	60.0	58.3
28.10.22	*H. halys egg mass*	XG_6	*B. bassiana* XG/2B	*H*	18	14	0	0	0	0	0	22.2	100.0	100.0	100.0	100.0	100.0	100.0
28.10.22	*H. halys egg mass*	K1	Control	*H*	23	21	21	18	16	15	13	8.7	8.7	21.7	30.4	34.8	43.5	38.1
28.10.22	*H. halys egg mass*	K2	Control	*H*	22	18	18	15	15	15	14	18.2	18.2	31.8	31.8	31.8	36.4	22.2
28.10.22	*H. halys egg mass*	K3	Control	*H*	28	28	28	28	27	24	23	0.0	0.0	0.0	3.6	14.3	17.9	17.9
28.10.22	*H. halys egg mass*	K4	Control	*H*	25	22	18	16	11	11	10	12.0	28.0	36.0	56.0	56.0	60.0	54.5
28.10.22	*H. halys egg mass*	K5	Control	*H*	27	26	25	23	23	22	21	3.7	7.4	14.8	14.8	18.5	22.2	19.2
28.10.22	*H. halys egg mass*	K6	Control	*H*	28	27	27	27	25	25	22	3.6	3.6	3.6	10.7	10.7	21.4	18.5
28.10.22	*H. halys egg mass*	BP5_1	*M. brunneum* BIPESCO 5	*H*	25	23	0	0	0	0	0	8.0	100.0	100.0	100.0	100.0	100.0	100.0
28.10.22	*H. halys egg mass*	BP5_2	*M. brunneum* BIPESCO 5	*H*	8	8	0	0	0	0	0	0.0	100.0	100.0	100.0	100.0	100.0	100.0
28.10.22	*H. halys egg mass*	BP5_3	*M. brunneum* BIPESCO 5	*H*	8	5	0	0	0	0	0	37.5	100.0	100.0	100.0	100.0	100.0	100.0
28.10.22	*H. halys egg mass*	BP5_4	*M. brunneum* BIPESCO 5	*H*	18	17	0	0	0	0	0	5.6	100.0	100.0	100.0	100.0	100.0	100.0
28.10.22	*H. halys egg mass*	BP5_5	*M. brunneum* BIPESCO 5	*H*	21	21	4	1	1	1	1	0.0	81.0	95.2	95.2	95.2	95.2	95.2
28.10.22	*H. halys egg mass*	BP5_6	*M. brunneum* BIPESCO 5	*H*	28	28	3	0	0	0	0	0.0	89.3	100.0	100.0	100.0	100.0	100.0
28.10.22	*H. halys egg mass*	GT7_1	*M. brunneum* GT7	*H*	21	11	0	0	0	0	0	47.6	100.0	100.0	100.0	100.0	100.0	100.0
28.10.22	*H. halys egg mass*	GT7_2	*M. brunneum* GT7	*H*	20	0	0	0	0	0	0	100.0	100.0	100.0	100.0	100.0	100.0	N.a.
28.10.22	*H. halys egg mass*	GT7_3	*M. brunneum* GT7	*H*	23	16	0	0	0	0	0	30.4	100.0	100.0	100.0	100.0	100.0	100.0
28.10.22	*H. halys egg mass*	GT7_4	*M. brunneum* GT7	*H*	28	28	0	0	0	0	0	0.0	100.0	100.0	100.0	100.0	100.0	100.0
28.10.22	*H. halys egg mass*	GT7_5	*M. brunneum* GT7	*H*	12	4	0	0	0	0	0	66.7	100.0	100.0	100.0	100.0	100.0	100.0
28.10.22	*H. halys egg mass*	GT7_6	*M. brunneum* GT7	*H*	27	27	0	0	0	0	0	0.0	100.0	100.0	100.0	100.0	100.0	100.0
27.04.23	*H. halys egg mass*	K1	Control	*I*	28	25	25	25	20	16	14	10.7	10.7	10.7	28.6	42.9	50.0	44.0
27.04.23	*H. halys egg mass*	K2	Control	*I*	18	9	9	9	7	7	7	50.0	50.0	50.0	61.1	61.1	61.1	22.2
27.04.23	*H. halys egg mass*	K3	Control	*I*	17	15	15	15	14	11	10	11.8	11.8	11.8	17.6	35.3	41.2	33.3
27.04.23	*H. halys egg mass*	K4	Control	*I*	28	24	24	24	19	18	17	14.3	14.3	14.3	32.1	35.7	39.3	29.2
27.04.23	*H. halys egg mass*	K5	Control	*I*	9	7	7	7	6	6	6	22.2	22.2	22.2	33.3	33.3	33.3	14.3

Date of treatment	Target	Egg mass label	Treatment	Experiment	No. eggs / egg mass	Hatched eggs	No. of individuals / developement stage					Cumulative mortality [%]						
							N2	N3	N4	N5	adult	Egg to N1	Egg to N2	Egg to N3	Egg to N4	Egg to N5	Egg to adult	N1 to adult
27.04.23	*H. halys egg mass*	K6	Control	*I*	26	15	15	13	4	4	3	42.3	42.3	50.0	84.6	84.6	88.5	80.0
27.04.23	*H. halys egg mass*	Vel1	Velifer® 1mL/L	*I*	22	16	0	0	0	0	0	27.3	100.0	100.0	100.0	100.0	100.0	100.0
27.04.23	*H. halys egg mass*	Vel2	Velifer® 1mL/L	*I*	19	16	0	0	0	0	0	15.8	100.0	100.0	100.0	100.0	100.0	100.0
27.04.23	*H. halys egg mass*	Vel3	Velifer® 1mL/L	*I*	26	26	0	0	0	0	0	0.0	100.0	100.0	100.0	100.0	100.0	100.0
27.04.23	*H. halys egg mass*	Vel4	Velifer® 1mL/L	*I*	23	18	0	0	0	0	0	21.7	100.0	100.0	100.0	100.0	100.0	100.0
27.04.23	*H. halys egg mass*	Vel5	Velifer® 1mL/L	*I*	28	22	0	0	0	0	0	21.4	100.0	100.0	100.0	100.0	100.0	100.0
27.04.23	*H. halys egg mass*	Vel6	Velifer® 1mL/L	*I*	30	28	0	0	0	0	0	6.7	100.0	100.0	100.0	100.0	100.0	100.0
28.04.23	*H. halys egg mass*	XG_1	*B. bassiana* XG/2B	*J*	25	23	22	19	17	16	15	8.0	12.0	24.0	32.0	36.0	40.0	34.8
28.04.23	*H. halys egg mass*	XG_2	*B. bassiana* XG/2B	*J*	26	19	17	16	12	8	8	26.9	34.6	38.5	53.8	69.2	69.2	57.9
28.04.23	*H. halys egg mass*	XG_3	*B. bassiana* XG/2B	*J*	29	26	19	16	8	8	8	10.3	34.5	44.8	72.4	72.4	72.4	69.2
28.04.23	*H. halys egg mass*	XG_4	*B. bassiana* XG/2B	*J*	25	1	1	0	0	0	0	96.0	96.0	100.0	100.0	100.0	100.0	100.0
28.04.23	*H. halys egg mass*	XG_5	*B. bassiana* XG/2B	*J*	22	19	17	15	8	8	8	13.6	22.7	31.8	63.6	63.6	63.6	57.9
28.04.23	*H. halys egg mass*	XG_6	*B. bassiana* XG/2B	*J*	26	24	22	19	8	7	6	7.7	15.4	26.9	69.2	73.1	76.9	75.0
28.04.23	*H. halys egg mass*	K1	Control	*J*	28	26	26	26	26	24	22	7.1	7.1	7.1	7.1	14.3	21.4	15.4
28.04.23	*H. halys egg mass*	K2	Control	*J*	28	28	27	26	23	21	20	0.0	3.6	7.1	17.9	25.0	28.6	28.6
28.04.23	*H. halys egg mass*	K3	Control	*J*	28	28	28	12	12	12	12	0.0	0.0	57.1	57.1	57.1	57.1	57.1
28.04.23	*H. halys egg mass*	K4	Control	*J*	20	16	15	14	13	11	9	20.0	25.0	30.0	35.0	45.0	55.0	43.8
28.04.23	*H. halys egg mass*	K5	Control	*J*	28	28	28	27	26	23	23	0.0	0.0	3.6	7.1	17.9	17.9	17.9
28.04.23	*H. halys egg mass*	K6	Control	*J*	26	20	20	20	20	20	19	23.1	23.1	23.1	23.1	23.1	26.9	5.0
28.04.23	*H. halys egg mass*	Vel1	Velifer® 1mL/L	*J*	32	21	4	3	2	1	1	34.4	87.5	90.6	93.8	96.9	96.9	95.2
28.04.23	*H. halys egg mass*	Vel2	Velifer® 1mL/L	*J*	24	23	9	3	1	1	0	4.2	62.5	87.5	95.8	95.8	100.0	100.0
28.04.23	*H. halys egg mass*	Vel3	Velifer® 1mL/L	*J*	21	18	13	8	5	5	5	14.3	38.1	61.9	76.2	76.2	76.2	72.2
28.04.23	*H. halys egg mass*	Vel4	Velifer® 1mL/L	*J*	28	11	0	0	0	0	0	60.7	100.0	100.0	100.0	100.0	100.0	100.0
28.04.23	*H. halys egg mass*	Vel5	Velifer® 1mL/L	*J*	21	21	0	0	0	0	0	0.0	100.0	100.0	100.0	100.0	100.0	100.0
28.04.23	*H. halys egg mass*	Vel6	Velifer® 1mL/L	*J*	26	21	11	0	0	0	0	19.2	57.7	100.0	100.0	100.0	100.0	100.0

Date of treatment	Target	Egg mass label	Treatment	Experiment	No. eggs / egg mass	Hatched eggs	No. of individuals / developement stage					Cumulative mortality [%]						
							N2	N3	N4	N5	adult	Egg to N1	Egg to N2	Egg to N3	Egg to N4	Egg to N5	Egg to adult	N1 to adult
31.08.23	*H. halys egg mass*	K1	Control	*K*	27	26	25	23	23	18	13	3.7	7.4	14.8	14.8	33.3	51.9	50.0
31.08.23	*H. halys egg mass*	K2	Control	*K*	26	22	21	18	17	14	11	15.4	19.2	30.8	34.6	46.2	57.7	50.0
31.08.23	*H. halys egg mass*	K3	Control	*K*	29	28	28	23	22	21	17	3.4	3.4	20.7	24.1	27.6	41.4	39.3
31.08.23	*H. halys egg mass*	K4	Control	*K*	29	28	28	26	23	19	13	3.4	3.4	10.3	20.7	34.5	55.2	53.6
31.08.23	*H. halys egg mass*	K5	Control	*K*	14	1	1	1	1	1	1	92.9	92.9	92.9	92.9	92.9	92.9	0.0
31.08.23	*H. halys egg mass*	K6	Control	*K*	28	23	23	20	14	12	9	17.9	17.9	28.6	50.0	57.1	67.9	60.9
31.08.23	*H. halys egg mass*	Vel1	Velifer® 1mL/L	*K*	23	12	0	0	0	0	0	47.8	100.0	100.0	100.0	100.0	100.0	100.0
31.08.23	*H. halys egg mass*	Vel2	Velifer® 1mL/L	*K*	27	26	0	0	0	0	0	3.7	100.0	100.0	100.0	100.0	100.0	100.0
31.08.23	*H. halys egg mass*	Vel3	Velifer® 1mL/L	*K*	24	21	0	0	0	0	0	12.5	100.0	100.0	100.0	100.0	100.0	100.0
31.08.23	*H. halys egg mass*	Vel4	Velifer® 1mL/L	*K*	24	24	0	0	0	0	0	0.0	100.0	100.0	100.0	100.0	100.0	100.0
31.08.23	*H. halys egg mass*	Vel5	Velifer® 1mL/L	*K*	29	25	16	9	9	8	7	13.8	44.8	69.0	69.0	72.4	75.9	72.0
31.08.23	*H. halys egg mass*	Vel6	Velifer® 1mL/L	*K*	23	18	0	0	0	0	0	21.7	100.0	100.0	100.0	100.0	100.0	100.0
20.09.23	*H. halys egg mass*	K1	Control	*L*	26	26	26	23	22	22	19	0.0	0.0	11.5	15.4	15.4	26.9	26.9
20.09.23	*H. halys egg mass*	K2	Control	*L*	21	19	19	19	18	18	12	9.5	9.5	9.5	14.3	14.3	42.9	36.8
20.09.23	*H. halys egg mass*	K3	Control	*L*	26	21	21	19	19	19	17	19.2	19.2	26.9	26.9	26.9	34.6	19.0
20.09.23	*H. halys egg mass*	K4	Control	*L*	26	16	16	11	11	11	11	38.5	38.5	57.7	57.7	57.7	57.7	31.3
20.09.23	*H. halys egg mass*	K5	Control	*L*	28	28	27	24	23	23	17	0.0	3.6	14.3	17.9	17.9	39.3	39.3
20.09.23	*H. halys egg mass*	K6	Control	*L*	27	24	23	22	17	12	8	11.1	14.8	18.5	37.0	55.6	70.4	66.7
20.09.23	*H. halys egg mass*	BP5_1	*M. brunneum* BIPESCO 5	*L*	26	25	0	0	0	0	0	3.8	100.0	100.0	100.0	100.0	100.0	100.0
20.09.23	*H. halys egg mass*	BP5_2	*M. brunneum* BIPESCO 5	*L*	26	22	0	0	0	0	0	15.4	100.0	100.0	100.0	100.0	100.0	100.0
20.09.23	*H. halys egg mass*	BP5_3	*M. brunneum* BIPESCO 5	*L*	25	22	14	4	4	4	4	12.0	44.0	84.0	84.0	84.0	84.0	81.8
20.09.23	*H. halys egg mass*	BP5_4	*M. brunneum* BIPESCO 5	*L*	28	27	17	4	2	2	2	3.6	39.3	85.7	92.9	92.9	92.9	92.6
20.09.23	*H. halys egg mass*	BP5_5	*M. brunneum* BIPESCO 5	*L*	26	22	0	0	0	0	0	15.4	100.0	100.0	100.0	100.0	100.0	100.0
20.09.23	*H. halys egg mass*	BP5_6	*M. brunneum* BIPESCO 5	*L*	8	7	0	0	0	0	0	12.5	100.0	100.0	100.0	100.0	100.0	100.0