Supplementary Data for

Natural nematicidal metabolites and advances in their biocontrol capacity on plant parasitic nematodes

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Table S1 Natural nematicidal metabolites reported from 2010-2021. (“: identical data to the entry immediately above)

Number	Compound	Producer	Nematode	Activity	Reference
1	Tenvermectin A	*Streptomyces avermitilis* (engineered strain MHJ1011)	*Bursaphelenchus xylophilus* (*B. xylophilus*): a pine wood nematode, cause pine wilt disease. Infection: *Pinus*, *Larix* et al. Control: fumigation of infected trees, application of pesticides against insect vector, injection of nematicides.	LC_{50}=1.951 μg mL^{-1} (mixture of **1** and **2** at ratio of 3:1) at 24	11
2	Tenvermectin B	“	“	“	“
3	Tenvermectin C	“	“	LC_{50}=3.8156 μg mL^{-1} at 24 h	12
4	Tenvermectin D	“	“	LC_{50}=4.1542 μg mL^{-1} at 24 h	“
5	(13*S*,25*R*)-5-*O*-demethyl-28-deoxy-13-[[2,6-dideoxy-4-*O*-(2,6-dideoxy-3-*O*-methyl-α-L-*arabino*-hexopyranosyl)-3-*O*-methyl-α-L-*arabino*-hexopyranosyl]oxy]-25-methyl-milbemycin B	*S. avermitilis* (engineered strain TM24)	*B. xylophilus*	LC_{50}=28.60±8.99 μg mL^{-1} at 24 h	13
6	(13*S*,25*R*)-5-demethoxy-28-deoxy-13-[[2,6-dideoxy-4-*O*-(2,6-dideoxy-3-*O*-methyl-α-L-*arabino*-hexopyranosyl)-3-*O*-methyl-α-L-*arabino*-hexopyranosyl]oxy]-25-ethyl-5-oxo-milbemycin B	“	“	LC_{50}=17.11±4.03 μg mL^{-1} at 24 h	“
7	(13*S*,25*R*)-5-*O*-demethyl-28-deoxy-13-[[2,6-dideoxy-4-*O*-(2,6-dideoxy-3-O-methyl-α-L-arabino-hexopyranosyl)-3-*O*-methyl-α-L-arabino-hexopyranosyl]oxy]-25-ethyl-24-hydroxy-milbemycin B	“	“	LC_{50}=12.23±1.29 μg mL^{-1} at 24 h	“
8	(13*S*,25*R*)-5-*O*-demethyl-28-deoxy-13-[[2,6-dideoxy-4-*O*-(2,6-dideoxy-3-*O*-methyl-α-L-*arabino*-hexopyranosyl)-3-*O*-methyl-α-L-*arabino*-hexopyranosyl]oxy]-25-ethyl-31-hydroxy-milbemycin B	“	“	LC_{50}=19.92±3.38 μg mL^{-1}	“
9	(13*S*,25*R*)-2,5,6,7-tetradehydro-5-*O*-demethyl-7,28-dideoxy-13-[[2,6-dideoxy-4-*O*-(2,6-dideoxy-3-*O*-methyl-α-L-*arabino*-hexopyranosyl)-3-*O*-methyl-α-L-*arabino*-hexopyranosyl]oxy]-25-ethyl-31-hydroxy-milbemycin B	“	“	LC_{50}=4.56±0.48 μg mL^{-1} at 24 h	“
10	(13*S*,25*R*)-2,5,6,7-tetradehydro-5-*O*-demethyl-7,28-dideoxy-13-[[2,6-dideoxy-4-*O*-(2,6-dideoxy-3-*O*-methyl-α-L-*arabino*-hexopyranosyl)-3-*O*-methyl-α-L-*arabino*-hexopyranosyl]oxy]-25-ethyl-milbemycin B	“	“	LC_{50}=38.56 ± 11.09 μg mL^{-1} at 24 h	“
11	(13*S*,25*R*)-2,5,6,7-tetradehydro-5-*O*-demethyl-7,28-dideoxy-13-[(2,6-dideoxy-α-L-*arabino*-hexopyranosyl)oxy]-25-ethyl-milbemycin B	“	“	LC_{50}=4.30±0.87 μg mL^{-1} at 24 h	“
12	(13*S*,25*R*)-2,5,6,7-tetradehydro-5-*O*-demethyl-7,28-dideoxy-13-[[2,6-dideoxy-4-*O*-(2,6-dideoxy-3-*O*-methyl-α-L-*arabino*-hexopyranosyl)-3-*O*-methyl-α-L-*arabino*-hexopyranosyl]oxy]-25-ethyl-milbemycin B	“	“	LC_{50}=20.19±4.13 μg mL^{-1} at 24 h	“
13	(13*S*,25*R*)-5-*O*-demethyl-28-deoxy-13-[(2,6-dideoxy-3-*O*-methyl-α-L-*arabino*-hexopyranosyl)oxy]-25-(1-methylethyl)-milbemycin B	“	“	LC_{50}=8.34±0.48 μg mL^{-1} at 24 h	“
14	(13*S*,25*R*)-5-demethoxy-28-deoxy-13-[(2,6-dideoxy-3-*O*-methyl-α-L-*arabino*-hexopyranosyl)oxy]-25-ethyl-5-oxo-milbemycin B	“	“	LC_{50}>100 μg mL^{-1} at 24 h	“
15	(2'*R*,3*S*,5'*S*,6'*R*,7*R*,9*E*,11*S*,12*S*,13*E*,15*E*)-6'-cyclohexyl-3,4,5',6',7,8,11,12-octahydro-11,18-dihydroxy-5',10,12,19-tetramethyl-spiro[3,7-methano-1*H*,5*H*-2,6-benzodioxacyclooctadecin-5,2'-[2*H*]pyran]-1-one	*S. avermitilis* NEAU1069	*Caenorhabditis elegans* (*C. elegans*): a free-living nematode.	49.2±1.9 mortality: 10 μg mL^{-1} at 15 h	14
16	(2'*R*,3*S*,4'*S*,5'*S*,6'*R*,7*R*,9*E*,11*S*,12*S*,13*E*,15*E*)-6'-cyclohexyl-3,3',4,4',5',6',7,8,11,12-decahydro-4',11,18-trihydroxy-5',10,12,19-tetramethyl-spiro[3,7-methano-1*H*,5*H*-2,6-benzodioxacyclooctadecin-5,2'-[2*H*]pyran]-1-one	“	“	92.7±4.6 mortality: 10 μg mL^{-1} at 15 h	“
17	25-Ethyl ivermectin	*S. avermitilis* (engineered strain AVE-H39)	“	LC_{50}=2.2±0.7 μg mL^{-1} (mixture of **17** and **18** at ratio of 7:3) at 15 h	15
18	25-Methyl ivermectin	“	“	“	“
19	5,27-Epoxy-13α-hydroxy milbemycin β_{11}	“	*B. xylophilus*	LC_{50}=240.2 μg mL^{-1} at 24 h	16
20	5,27-Eepoxy-13α-hydroxy-25-ethyl milbemycin β_{11}	“	“	LC_{50}=250.28 μg mL^{-1} at 24 h	“
21	13α-Hydroxymilbemycin β_{13}	“	“	LC_{50}=11.372 μg mL^{-1} at 24 h	17
22	26-Methyl-13α-hydroxymilbemycinβ_{13}	“	“	LC_{50}=12.074 μg mL^{-1} at 24 h	“
23	4-Hydroxy-$\Delta^{2,3}$-milbemycin A4	*Streptomyces bingchenggensis* (engineered strain BCJ60)	“	LC_{50}=5.145±0.248 μg mL^{-1} at 24 h	23
24	4-Hydroxy-$\Delta^{2,3}$-milbemycin A3	“	“	LC_{50}=5.288±0.478 μg mL^{-1} at 24 h	“
25	4,25-Diethyl-4,25-demethyl-milbemycin β_3	“	“	LC_{50}=5.909±1.183 μg mL^{-1} at 24 h	18
26	27-Formaldehyde-milbemycin β_{14}	“	“	LC_{50}=6.766±0.744 μg mL^{-1} at 24 h	“
27	Milbemycin M	“	“	LC_{50}=5.486±0.284 μg mL^{-1} at 24 h	22
28	Milbemycin N	“	“	LC_{50}=5.777±0.390 μg mL^{-1} at 24 h	“
29	Milbemycin P	“	“	LC_{50}=4.065±0.051 μg mL^{-1} at 24 h	19
30	Milbemycin Q	“	“	LC_{50}=4.117±0.064 μg mL^{-1} at 24 h	“
31	27-Aldehyde-5-oxomilbemycin β_{12}	“	“	LC_{50}=6.794±1.058 μg mL^{-1} at 24 h	21
32	2-Hydroxymilbemycin K	“	“	LC_{50}=7.852±0.116 μg mL^{-1} at 24 h	“
33	27-Methoxylmilbemycin α_{31}	“	“	LC_{50}=5.581±1.467 μg mL^{-1}	20
34	27-Oxomilbemycin α_{31}	“	“	LC_{50}=6.523±0.978 μg mL^{-1}	“
35	(4*Z*)-4-[(2*E*,4*R*,6*E*)-8-[(2*R*,4*S*,6*S*,8*S*,9*S*,10*S*)-8-[(1*E*)-1,3-dimethyl-1-buten-1-yl]-4,10-dihydroxy-9-methyl-1,7-dioxaspiro[5.5]undec-2-yl]	*Streptomyces microflavus neau3*	*C. elegans*	LC_{50}=15.4±1.0 μg mL^{-1} at 15 h	24

Number	Compound	Producer	Nematode	Activity	Reference
	-4,6-dimethyl-2,6-octadien-1-ylidene]-3,4-dihydro-6-hydroxy-7-methyl-1*H*-2-benzopyran-1-one				
36	(2'*R*,3*S*,4'*S*,5'*S*,6'*S*,7*R*,9*E*,12*R*,13*E*,15*E*)-6'-[(1*E*)-1,3-dimethyl-1-buten-1-yl]-3,3',4,4',5',6',7,8,11,12-decahydro-4',18-dihydroxy-5',10,12,19-tetramethyl-spiro[3,7-methano-1*H*,5*H*-2,6-benzodioxacyclooctadecin-5,2'-[2*H*]pyran]-1-one	"	"	LC_{50}=17.4 μg mL^{-1}	25
37	(6*R*,23*S*,25*S*)-25-[(1*E*)-1,3-dimethyl-1-buten-1-yl]-6,23-dihydroxy-milbemycin B	*S. microflavus* neau3 (mutant strain Y-3)	"	LC_{50}>100 μg mL^{-1}	26
38	(6*R*,23*S*,25*S*)-5-*O*-demethyl-28-deoxy-25-[(1*E*)-1,3-dimethyl-1-buten-1-yl]-6,28-epoxy-23-hydroxy-28-oxo-milbemycin B	"	"	IC_{50}=0.7±0.2 μg mL^{-1}	"
39	4"-*O*-glucosyl tenvermectin A	*Saccharopolyspora erythraea* ATCC 11635	*B. xylophilus*	LC_{50}=6.7984 μg mL^{-1} at 24 h	27
40	4"-*O*-glucosyl tenvermectin B	"	"	LC_{50}=5.7980 μg mL^{-1} at 24 h	"
41	Parviphenanthrine A	*Stemona parviflora*	*Meloidogyne incognita* (*M. incongnita*): southern root-knot nematode, one of the most damaging root-knot nematode species. Infection: fruits, vegetables, and crops. Control: sterilization of the soil, soil fumigation (dazomet), cultural practices, chemical nematicides (fosthiazate, fluopyram et al.), biocontrol agents (avermectins).	IC_{50}=14.02±0.32 μM at 24 h	28
42	Parviphenanthrine E	"	"	IC_{50}=2.51±0.13 μM at 24 h	"
43	Stilbostenin E	"	"	IC_{50}=2.05±0.07 μM at 24 h	"
44	Schaftoside	*Arisaema erubescens*	"	LC_{50}=114.66 μg mL^{-1} at 72 h	29
45	Isoschaftoside	"	"	LC_{50}=323.09 μg mL^{-1} at 72 h	"
46	Patuletin	*Tagetes patula*	*M. incognita*	LC_{50}=236.00 μg mL^{-1} at 48h	30
47	Patulitrin	"	"	LC_{50}=506.00 μg mL^{-1} at 48h	"
48	Isoneochamaejasmin A	*Stellera chamaejasme*	*Aphelenchoides besseyi* (*A. besseyi*); rice white tip nematode, an important seed-borne ectoparasite of rice. Infection: rice *et al*. Control: seed disinfection, synthetic nematicides. *Ditylenchus destructor* (*D. destructor*): potato tuber nematode. Infectiong: vegetables. Control: cultural control, nematicides.	LC_{50}=2320 μM, 180 μM at 72h	31
49	Chamaejasmenin B	"	"	LC_{50}=3940 μM, 290 μM at 72h	"
50	Neochamaejasmin B	"	"	LC_{50}=2740 μM, 15600 μM at 72h	"
51	Daphnodorin A	*Daphne acutiloba*	*M. incognita*	40.23±1.85% mortality: 25 μg mL^{-1} at 24h	32
52	Daphnodorin B	"	"	45.63±2.36% mortality: 25 μg mL^{-1} at 24h	"
53	Daphneone	"	"	49.15±2.51% mortality: 25 μg mL^{-1} at 24h	"
54	Daphneolon	"	"	70.60±3.28% mortality: 25 μg mL^{-1} at 24h	"
55	C-glycoside luteolin 6-C-(2"-*O*-*trans*-coumaroyl-*D*-malate)-*β*-glucoside	*Lemna japonica*	"	EC_{50}=1560±120 μg mL^{-1} at 48h	33
56	Ruixianglangdusu B	*Stellera chamaejasme*	*B. xylophilus*; *Bursaphelenchus mucronatus* (*B. mucronatus*): a plant-parasitic nematode existing in pine forests, a sister species of *B. xylophilus*.	LC_{50}=15.7 μM, 0.6 μM at 72h	34
57	Chamaejasmenin C	"	"	LC_{50}=2.7 μM, 3.1 μM at 72h	"
58	7-Methoxyneochaejasmin A	"	"	LC_{50}=167.3 μM, 151.1 μM at 72h	"
59	(+)-Chamaejasmine	"	"	LC_{50}=4.7 μM, 5.1X10^{3} μM at 72h	"
60	Chamaechromone	"	"	LC_{50}=36.7 μM; 0.003 μM at 72h	"
61	Isosikokianin A	"	"	LC_{50}=2.2X10^{3} μM, 2.3 μM at 72h	"
62	Chrysophanol	*Rheum emodi*	*M. incognita*	ED_{50}=102.59 μg mL^{-1} at 72h	35
63	Physcion	"	"	ED_{50}=102.61 μg mL^{-1} at 72h	"
64	Emodin	"	"	ED_{50}=139.95 μg mL^{-1} at 72h	"
65	Aloe-emodin	"	"	ED_{50}=148.50 μg mL^{-1} at 72h	"
66	Squamocin-L	*Annona squamosa*	*M. incognita*; *B. xylophilus*	LC_{50}=0.018 μg mL^{-1} at 48h agaist *B. xylophilus*; weak activity against *M. incognita*	36
67	Squamocin-M	"	"	LC_{50}=0.024 μg mL^{-1} at 48h agaist *B. xylophilus*; weak activity against *M. incognita*	"
68	Squamocin-J	"	"	LC_{50}=0.025 μg mL^{-1} at 48h agaist *B. xylophilus*; weak activity against *M. incognita*	"

Number	Compound	Producer	Nematode	Activity	Reference
69	Squamocin-K	"	"	LC_{50}=0.039 µg mL^{-1} at 48h agaist *B. xylophilus*; weak activity against *M. incognita*	"
70	Squamocin-G	"	"	LC_{50}=0.008 µg mL^{-1} at 48h agaist *B. xylophilus*; LC_{50}=0.339 µg mL^{-1} at 48h against *M. incognita*	"
71	Squamocin-H	"	"	LC_{50}=0.012 µg mL^{-1} at 48h agaist *B. xylophilus*; LC_{50}=71.21 µg mL^{-1} at 48h against *M. incognita*	"
72	Squamostatin-A	"	"	LC_{50}=0.048 µg mL^{-1} at 48h agaist *B. xylophilus*; weak activity against *M. incognita*	"
73	Squamocin	"	"	LC_{50}=0.006 µg mL^{-1} at 48h agaist *B. xylophilus*; LC_{50}=54.90 µg mL^{-1} at 72h against *M. incognita*	"
74	Annotemoyin-1	"	"	LC_{50}=0.947 µg mL^{-1} at 48h agaist *B. xylophilus*; weak activity against *M. incognita*	"
75	Solamin	"	"	LC_{50}>1 µg mL^{-1} at 48h agaist *B. xylophilus*; weak activity against *M. incognita*	"
76	Falcarindiol	*Notopterygium incisum*	"	LC_{50}=1.08 µg mL^{-1}, 2.20 µg mL^{-1} at 72h	37
77	Falcarinol	"	"	LC_{50}=4.96 µg mL^{-1}; LC_{50}=12.61 µg mL^{-1} at 72h	"
78	(*E*)-6-styrylpyran-2-one	*Cryptocarya aschersoniana*	*M. incognita*	active	42
79	(*R*)-goniothalamin	"	"	active	"
80	Octacosanoic acid	*Galinsoga parviflora*	*M. incognita*; *Cephalobus litoralis* (*C. litoralis*): a free living soil nematode.	82% mortality against *M. incognita*; 60% mortality against *C. litoralis* at 1% after 48h	43
81	Peperomianone	*Peperomia japonica*	*C. elegans*	LC_{50}=10.1 µg mL^{-1}	40
82	4-Hydroxy-2-[(3,4-methylenedioxyphenyl)undecanoyl]cyclohexane-1,3-dione	"	"	LC_{50}=16.7 µg mL^{-1}	"
83	1-Monopalmitin	*Eucalyptus exserta*	*M. incognita*	77.0±6.30 mortality at 100 µg mL^{-1} at 72h	41
84	Artehaloyn A	*Artemisia halodendron*	"	LC_{50}=0.21±0.03 µg mL^{-1} at 48h	42
85	Artehaloyn B	"	"	LC_{50}=2.1 µg mL^{-1} at 48h (about)	"
86	(3*R*,8*S*)-heptadeca-1,16-dien-4,6-diyne-3,8-diol	"	"	LC_{50}=2.4 µg mL^{-1} at 48h (about)	"
87	Dehydrofalcarinol	"	"	LC_{50}=3.5 µg mL^{-1} at 48h (about)	"
88	1,3*R*,8*S*-trihydroxydec-9-en-4,6-yne	"	"	LC_{50}=9.6 µg mL^{-1} at 48h (about)	"
89	3(*R*),8(*E*)-decene-4,6-diyne-1,3,10-triol	"	"	LC_{50}=5.2 µg mL^{-1} at 48h (about)	"
90	Nonacosane-10-ol	*Fumaria parviflora*	"	100% mortality and 95.0% egg-hatching inhibition at 200 µg mL^{-1} at 120h	43
91	(+)-Majorynolide	*Persea indica*	*Meloidogyne javanica* (*M. javanica*): one of the most economically important species of root-knot nematodes.	LD_{50}=180 µg mL^{-1}; LD_{90}=330 µg mL^{-1} at 72h	44
92	Artabsithiophene A	*Artemisia absinthium*	*M. incognita*	LC_{50}=2.69±0.23 µg mL^{-1} at 24h	45
93	Artabsithiophene B	"	"	LC_{50}=4.17±0.41 µg mL^{-1} at 24h	"
94	Methyl (*E*)-3-(5-(prop-1-yn-1-yl) thiophen-2-yl) acrylate	"	"	LC_{50}=6.13±0.19 µg mL^{-1} at 24h	"
95	*Trans*-de-hydromatricaria ester	"	"	LC_{50}=7.65±0.22 µg mL^{-1} at 24h	"
96	Rhapontiynethiophenes A	"	"	LC_{50}=27.83±1.17 µg mL^{-1} at 24h	"
97	5-(3-Hydroxmethyl-3-isovaleroyloxyprop-1-ynyl)-2,2′-bithiophene	"	"	LC_{50}=12.25±3.34 µg mL^{-1} at 24h	"
98	5-(3,4-Diacetoxybut-1-ynyl)-2,2′-bithiophene	"	"	LC_{50}=16.37±2.11 µg mL^{-1} at 24h	"
99	5-(3-Acetoxy-4-isovaleroyloxybut-1-ynyl)-2,2′-bithiophene	"	"	LC_{50}=22.45±3.09 µg mL^{-1} at 24h	"
100	Echinothiophene A	*Echinops grijsii*	*M. incognita*	LC_{50}=0.42 µg mL^{-1} at 24h in light	46
101	Echinothiophene B	"	"	LC_{50}=2.65 µg mL^{-1} at 24h in light	"
102	Echinothiophene C	"	"	LC_{50}=16.55 µg mL^{-1} at 24h in light	"
103	Echinothiophene D	"	"	LC_{50}=2.57 µg mL^{-1} at 24h in light	"
104	Echinothiophene E	"	"	LC_{50}=8.28 µg mL^{-1} at 24h in light	"

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105	Echinothiophene F	"	"	LC_{50}=20.13 μg mL^{-1} at 24h in light	"
106	Arctinol-b	"	"	LC_{50}=13.48 μg mL^{-1} at 24h in light	"
107	2-Prop-1-inyl-5'-(2-hydroxy-3-chloropropyl) dithiophene	"	"	LC_{50}=0.91 μg mL^{-1} at 24h in light	"
108	6-Methoxy-arctinol-b	"	"	LC_{50}=5.83 μg mL^{-1} at 24h in light	"
109	Arctinol	"	"	LC_{50}=15.90 μg mL^{-1} at 24h in light	"
110	Arctinone-b	"	"	LC_{50}=1.14 μg mL^{-1} at 24h in light	"
111	Arctinal	"	"	LC_{50}=2.62 μg mL^{-1} at 24h in light	"
112	Echinbithiophenedimer A	*Echinops latifolius*	*M. incognita*	LC_{50}=16.53 μg mL^{-1} at 48h in light	47
113	Echinbithiophenedimer B	"	"	LC_{50}=13.88 μg mL^{-1} at 48h in light	"
114	Echinbithiophenedimer C	"	"	LC_{50}=8.73 μg mL^{-1} at 48h in light	"
115	α-Terthienyl	*Adenophyllum aurantium*	*Nacobbus aberrans* (*N. aberrans*): the false root-knot nematode. Infection: crops. Control: cultural practices, nematicides.	83.2%±5.2% immobility at 100 μg mL^{-1} after 24h	47
116	Cerebroside A	*Paecilomyces* sp.	*B. xylophilus*	100% mortality at 100 μg mL^{-1} at 24h	49
117	Cerebroside B	"	"	90.5% mortality at 1000 μg mL^{-1} at 24h	"
118	$C_{280\text{-}1}$	*Arthrobotrys oligospora* (the mutant *ΔAOL_s00215g280*)	*C. elegans*	inhibitory activity	50
119	$C_{280\text{-}2}$	"	"	"	"
120	$C_{280\text{-}3}$	"	"	"	"
121	5-*n*-Heneicosylresorcinol	*Gliocladium roseum* YMF1.00133	*C. elegans*; *B. xylophilus* *Panagrellus redivivus* (*P. redivivus*): a free-living nematode.	ED_{50}=30 μg mL^{-1} against *C. elegans*; 80 μg mL^{-1} against *P. redivivus*; 180 μg mL^{-1} against *B. xylophilus* at 24h	51
122	Aurovertin D	*Pochonia chlamydosporia* YMF 1.00613	*C. elegans*; *P. redivivus*; *M. incognita*	LC_{50}=41.7μg mL^{-1} at 48h against *P. redivevus*; 16.45 μg mL^{-1} at 24h against *M. incognita*; 33.50 μg mL^{-1} at 24h against *C. elegans*	52 and 53
123	Aurovertin F	"	*P. redivivus*	LC_{50}=88.6 μg mL^{-1} at 48h against *P. redivivus*	52
124	(*R*)-pyricuol	*Magnaporthe grisea*	*C. elegans*	94.5% mortality: 400 μg mL^{-1} at 48h	54
125	Phelligridin L	*Sanghuangporus* sp.	*C. elegans*	LD_{50}=12.5 μg mL^{-1} at 18h	55
126	3,14'-Bihispidinyl	"	"	LD_{50}=50 μg mL^{-1} at 18h	"
127	Hispidin	"	"	LD_{50}=12.5 μg mL^{-1} at 18h	"
128	αβ-Dehydrocurvularin (αβ-DC)	*Aspergillus welwitschiae*	*Meloidogyne graminicola* (*M. graminicola*): one of the most devastating root-knot nematodes on rice.	LD_{50}=122.2 μg mL^{-1} at 48h	56
129	Gibepyrone D	*Fusarium oxysporum* 162	*M. incognita*	LC_{50}=134.31 μg mL^{-1} at 72h	57
130	Gibepyrone G	"	"	LC_{50}=265.57 μg mL^{-1} at 72h	"
131	Grammicin	*Xylaria grammica* KCTC 13121BP	*M. incognita*	EC_{50}=15.9 μg mL^{-1} at 72h	58
132	Alternariol 9-methyl ether	*Alternaria* sp. Samif01	*C. elegans* *B. xylophilus*	IC_{50}=98.17 μg mL^{-1} against *B. xylophilus*; 74.62 μg mL^{-1} against *C. elegans*	59
133	Thailanone A	*Pseudobambusicola thailandica*	*C. elegans*	LD_{90}=≤50 μg mL^{-1} at 18h	60
134	Thailanone B	"	"	LD_{90}=≤25 μg mL^{-1} at 18h	"
135	Thailanone C	"	"	LD_{90}=≤25 μg mL^{-1} at 18h	"
136	Thailanone D	"	"	LD_{90}=≤12.5 μg mL^{-1} at 18h	"
137	Thailanone E	"	"	LD_{90}=≤50 μg mL^{-1} at 18h	"
138	Thailanone F	"	"	LD_{90}=≤25 μg mL^{-1} at 18h	"
139	Deoxyphomalone	"	"	LD_{90}=≤12.5 μg mL^{-1} at 18h	"
140	Fungichromin B	*S. albogriseolus* HA10002	*M. incognita* *M. javanica*	LD_{50}=7.64 μg mL^{-1}; 7.83 μg mL^{-1}	61
141	10-(2,2-Dimethyl-cyclohexyl)-6,9-dihydroxy-4,9-dimethyl-dec-2-enoic acid methylester	*S. hydrogenans* DH16	*M. incognita*	100% mortality: 200 μg mL^{-1} at 72h; 0% egg hatching: 200 μg mL^{-1} at 160h	62 and 63
142	Spectinabilin	*Streptomyces* sp. AN091965	*B. xylophilus*	LC_{50}=0.84 μg mL^{-1} at 24h	64
143	Sphingosine	*Bacillus cereus* S2	*M. incognita* *C. elegans*	LC_{50}=0.64 μg mL^{-1}	65
144	Phytosphingosine	"	"	active	"
145	2-Methylbutyric acid (2-MBA)	*Bacillus pumilus*	*Meloidogyne arenaria* (*M. arenaria*): peanut root knot nematode, one of the most economically important species of root-knot nematodes.	24.4%-100.0% mortality: 125-1000 μg mL^{-1} at 48h; 32.7% egg hatchability: 500 μg mL^{-1} at 96h	66
146	3,3,4,5-Tetramethyl-2*H*-pyran-2,6(3*H*)-dione	*Lavandula luisieri*	*M. javanica*	LD_{50}=240 μg mL^{-1} at 72h	67

Number	Compound	Producer	Nematode	Activity	Reference
147	Methyl 3,4,5,5-tetramethyl-1,3-cyclopentadienecarboxylic acid	"	"	53.9±5.1% mortality: 500 μg mL^{-1} at 72h	"
148	1β,2α-Dihydroxyeudesma-4(15),11(12)-dien-13-oic acid methyl ester	*Artemisia dubia*	*M. incognita*	LC_{50}=38.43 μg mL^{-1} at 24h	68
149	Artemisinin	*Artemisia annua*	*Globodera rostochiensis* (*G. rostochiensis*): potato golden nematode. Infection: potato et al. Control: cultural practices, nematicides.	50.3% mortality: 50 μg mL^{-1} at 24h	69
150	7-Hydroxycadalene	*Heterotheca inuloides*	*N. aberrans*	LC_{50}=31.30±2.003 μg mL^{-1} at 36h	70
151	(4*R*)-7-hydroxy-3,4-dihydrocadalene	"	"	LC_{50}=26.30±1.28 μg mL^{-1} at 36h	"
152	1β,6β-Dihydroxy-*cis*-eudesm-3-ene-6-*O*-*β*-D-glucopyranoside	*Liriope muscari*	*B. xylophilus*	LC_{50}=82.84 μg mL^{-1} at 72h	71
153	1α,6β-Dihydroxy-*cis*-eudesm-3-ene-6-*O*-*β*-*D*-glucopyranoside	"	"	LC_{50}=153.39 μg mL^{-1} at 72h	"
154	1,4-Epoxy-*cis*-eudesm-6-*O*-*β*-D-glucopyranoside	"	"	LC_{50}=339.76 μg mL^{-1} at 72h	"
155	1α,6β-Dihydroxy-5,10-bis-epi-eudesm-4(15)-ene-6-*O*-*β*-D-glucopyranoside	"	"	LC_{50}=465.68 μg mL^{-1} at 72h	"
156	Pulisignoside C	*Pulicaria insignis*	*M. incognita*	IC_{50}=25.42±0.28 μM at 24h	72
157	Stereumene B	*Stereum* sp. YMF1.04183	*C. elegans*	41.1% mortality: 200 μg mL^{-1} at 24h	73
158	Trichodermin	*Trichoderma* sp. YMF1.02647	*P. redivivus* *C. elegans* *B. xylophilus*	95% mortality: 400 μg mL^{-1} at 72h against *P. redivivus* and *C. elegans*; 54.2% mortality: 400 μg mL^{-1} at 72h against *B. xylophilus*	74
159	Verrucarin A	*Myrothecium verrucaria* KACC 40321	*M. incognita*	LD_{50}=1.88 μg mL^{-1}	75
160	Roridin A	"	"	LD_{50}=1.50 μg mL^{-1}	"
161	Leoleorin C	*Leonotis leonurus*	*C. elegans*	44.61±2.03 mortality: 500 μg mL^{-1} at 24h	76
162	8-Epidiosbulbin e acetate	*Aristolochia tuberosa*	*M. javanica*	32.70±1.57% mortality: 200 μg mL^{-1} at 96h	77
163	Diosbulbin B	"	"	25.30±1.43% mortality: 200 μg mL^{-1} at 96h	"
164	Botryosphaerins H	*Botryosphaeria* sp. P483	*P. redivivus*; *C. elegans*	30% and 28% mortality: 400 μg mL^{-1} at 24h	78
165	Oidiolactone D	*Oidiodendron* sp.	*Pratylenchus penetrans* (*P. penetrans*): the root-lesion nematode. Infection: crop, flower, fruit. Control: Increase nitrogen fertilizer; nematicides. *B. xylophilus*	38% and 31% mortality: 3000 μM at 72h	79
166	Cordinol	*Cordia latifolia*	*M. incognita*	50% mortality: 0.50% at 24h	80
167	Cordioic acid	"	"	100% mortality: 0.50% at 24h	"
168	Cordifolic acid	"	"	80% mortality: 0.50% at 24h	"
169	Cordinoic acid	"	"	100% mortality: 0.50% at 24h	"
170	Hederacholchiside E	*Pulsatilla koreana*	*M. incognita*	LD_{50}=136.7±38.6 μg mL^{-1} at 24h	81
171	Hederacoside B	"	"	LD_{50}=126.8±29.7 μg mL^{-1} at 24h	"
172	3-*O*-*β*-D-glucopyranosyl (1→3)-α-L-rhamnopyranosyl (1→2)-α-L-arabinopyranosyl oleanolic acid	"	"	LD_{50}=169.2±38.9 μg mL^{-1} at 72h	"
173	Raddeanoside R13	"	"	LC_{50}=88.7±21.9 μg mL^{-1} at 24h	"
174	Hederacholchiside F	"	"	LC_{50}=177.0±49.2 μg mL^{-1} at 24h	"
175	Pulsatilla saponin F	"	"	LC_{50}=186.7±56.4 μg mL^{-1} at 24h	"
176	Hederoside C	"	"	LC_{50}=92.4±14.6 μg mL^{-1} at 24h	"
177	Pulsatilla saponin D	"	"	LC_{50}=103.9±36.2 μg mL^{-1} at 24h	"
178	Kalopanaxsaponin H	"	"	LC_{50}=184.3±36.7 μg mL^{-1} at 72h	"
179	Lancamarolide	*Lantana camara*	*M. incognita*	60% mortality: 0.0625% at 72h	82
180	Oleanonic acid	"	"	80% mortality: 0.0625% at 72h	"
181	Lantadene A	"	"	70% mortality: 0.0625% at 72h	"
182	11-Hydroxy-3-oxours-12-en-28-oic acid	"	"	40% mortality: 0.0625% at 72h	"
183	Betulinic acid	"	"	50% mortality: 0.0625% at 72h	"
184	Lantadene B	"	"	60% mortality: 0.0625% at 72h	"
185	Lantaninilic acid	"	"	60% mortality: 0.0625% at 72h	"
186	Ursolic acid	*Galinsoga parviflora*	*M. incognita*; *C. litoralis*	88% mortality: 1% at 48h against *M. incognita* 70% mortality: 1% at 48h	39

Number	Compound	Producer	Nematode	Activity	Reference
				against *C. litoralis*	
187	Evodol	*Evodia rutaecarpa*	*M. incognita*	LC_{50}=155.02 µg mL^{-1} at 72h	83
188	Limonin	"	"	LC_{50}=197.37 µg mL^{-1} at 72h	"
189	Tacacoside C	*Sicyos bulbosus*	*M. javanica*	97.16±14.6% mortality: 500 µg mL^{-1} at 72h	84
190	Durantanin III	"	"	73.84±2.93% mortality: 500 µg mL^{-1} at 72h	"
191	Heteropappussaponin 5	"	"	90.77±3.70% mortality: 500 µg mL^{-1} at 72h	"
192	Tacacosido B3	"	"	93.02±1.35% mortality: 500 µg mL^{-1} at 72h	"
193	3-*O*-*β*-D-glucopyranosyl (1→3)- *β*-D-glucopyranosyl-2*β*,3*β*,16α,23-tetrahydroxyolean-12-en-28-oic acid 28-*O*-α-L-rhamnopyranosyl-(1→ 3)-*β*-D-xylopyranosyl-(1→4)-α-L-hamnopyranosyl-(1→ 2)-α-L-arabinopyranoside	"	"	100±00% mortality: 500 µg mL^{-1} at 72h	"
194	Heteropappussaponin 7	"	"	92.77±3.57% mortality: 500 µg mL^{-1} at 72h	
195	3-*O*-*β*-D-glucopyranosyl (1→3)-*β*-D-glucopyran-osyl-2*β*,3*β*,16α,23-tetrahydroxyolean-12-en-28-oic acid 28-*O*-α-L-rhamnopyranosyl-(1→3)-*β*-D-xylopyranosyl-(1 →4)-[*β*-D-apio-syl-(1→3)]-α-L-rhamnopyranosyl-(1 →2)-α-L-arabinopyranoside	"	"	79.74±2.78% mortality: 500 µg mL^{-1} at 72h	
196	22-Deoxydichapetalin P	*Dichapetalum gelonioides*	*P. redivivus*	7.0±2.6% mortality: 100 µg mL^{-1} at 72h	85
197	25-de-*O*-acetyldichapetalin P	"	"	46.3±3.6% mortality: 100 µg mL^{-1} at 72h	"
198	Dichapetalin U	"	"	20.5±8.2% mortality: 100 µg mL^{-1} at 72h	"
199	22-Deoxy-4''-methoxydichapetalin V	"	"	4.8±0.4% mortality: 100 µg mL^{-1} at 72h	"
200	Dichapetalin W	"	"	7.8±1.5% mortality: 100 µg mL^{-1} at 72h	"
201	4''-Demethoxy-7-dihydrodichapetalin W	"	"	61.8±5.7% mortality: 100 µg mL^{-1} at 72h	"
202	7-Dehydrodichapetalin E	"	"	2.5±1.0% mortality: 100 µg mL^{-1} at 72h	"
203	21-Dehyrodichapetalin Q	"	"	3.0±0.7% mortality: 100 µg mL^{-1} at 72h	"
204	Dichapetalin A	"	"	15.3±4.8% mortality: 100 µg mL^{-1} at 72h	"
205	Dichapetalin K	"	"	4.4±0.5% mortality: 100 µg mL^{-1} at 72h	"
206	β-Sitosterol	*Galinsoga parviflora*	*M. incognita*; *C. litoralis*; *N. aberrans*	68% mortality: 0.5% at 48h against *M. incognita*; 43% mortality: 0.5% at 48h against *C. litoralis*	39 and 48
207	*β*-Sitosterol'3-*O*-,*β*-D-glucopyranoside	"	*M. incognita*; *C. litoralis*	70% mortality: 1% at 48h against *M. incognita*; 62% mortality: 1% at 48h against *C. litoralis*	39
208	Stigmasterol	*Adenophyllum aurantium*	*N. aberrans*	94.5±5.3% mortality: 100 µg mL^{-1} at 72h	48
209	23a-Homostigmast-5-en-3*β*-ol	*Fumaria parviflora*	*M. incognita*	100% mortality: 200 µg mL^{-1}; 90.3% egg-hatching inhibition at 200 µg mL^{-1}	47
210	Thermolide A	*Talaromyces thermophilus* YM 3-4	*M. incognita*; *Bursaphelenches siylopilus* (*B. siylopilus*): a pine wood nematode; *P. redivevus*	LC_{50}=0.8, 1.0, 0.6 µg mL^{-1}	86
211	Thermolide B	"	"	LC_{50}=0.7, 0.9, 0.5 µg mL^{-1}	"
212	Thermolide C	"	"	LC_{50}=30.5, 25.6, 40.8 µg mL^{-1}	"
213	Thermolide D	"	"	LC_{50}=55.6, 48.4, 56.9 µg mL^{-1}	"
214	Talathermophilin A	*Talaromyces thermophiles* YM1-3	*P. redivevus*	38% inhibition, 400 µg mL^{-1} at 72h	87
215	Talathermophilin B	"	"	44% inhibition, 400 µg mL^{-1} at 72h	"
216	Ophiotine	*Ophiosphaerella* sp.	*Heterodera filipjevi* (*H. filipjevi*): a cereal cyst nematode. Infection: wheat et al. Control: cultural practices, nematicides, biocontrol.	79% mortality: 50 µg mL^{-1};	88
217	Leucinostatin U	*Ijuhya vitellina*	*C. elegans*; *P. penetrans*	LD_{90}=5 µg mL^{-1}	89
218	Leucinostatin Q	"	"	LD_{90}=7 µg mL^{-1}	"
219	Leucinostatin P	"	"	LD_{90}=7 µg mL^{-1}	"
220	Trichomide D	*Trichothecium roseum*	*Heterodera avenae* (*H. filipjevi*): a cereal cyst nematode.	LC_{50}=94.9 µg mL^{-1} at 48h	90
221	Destruxin A5	"	"	LC_{50}=143.6 µg mL^{-1} at 48h	"
222	Homodestcardin	*Trichoderma longibrachiatum*	*M. incognita*	IC_{50}=149.2 µg mL^{-1} at 48h	91
223	Trichomide B	"	"	IC_{50}=140.6 µg mL^{-1} at 48h	"
224	Homodestruxin B	"	"	IC_{50}=198.7 µg mL^{-1} at 48h	"
225	Beauvericin	*Fusarium* spp.	*B. xylophilus*; *C. elegans*	46% mortality: 1mM at 48h against *B. xylophilus*; weak activity against *C. elegans*	92

Number	Compound	Producer	Nematode	Activity	Reference
226	Isovariecolorin I	*Eurotium cristatum* EN-220	*P. redivivus*	LD_{50}=110.3 μg mL^{-1}	94
227	E-7	"	"	LD_{50}=106.7 μg mL^{-1}	"
228	Didehydroechinulin	"	"	LD_{50}=126.4 μg mL^{-1}	"
229	Gliocladin C	*Gliocladium roseum* YMF1.00133	*C. elegans*; *P. redivivus*; *B. xylophilus*	ED_{50}=15, 50, and 200 μg mL^{-1}	51
230	(3*S*, 8a*S*)-hexahydro-3-methylpyrro[1,2-a]pyrazine-1,4-dione	*Bacillus* sp. SMrs28	*D. destructor*; *B. xylophilus*	62.94±2.66, 50.71±5.44 mortality: 800 μg mL^{-1} at 48h	95
231	Cyclo(D-Pro-L-Leu)	*Bacillus amyloliquefaciens* Y1	*M. incognita*	About 90% mortality: 2500 μg mL^{-1} at 72h	96
232	Cyclo(L-Pro-L-Leu)	*Pseudomonas putida* MCCC 1A00316; *Pseudomonas simiae* MB751		84.3% mortality: 67.5 μg mL^{-1} at 72h; 9.74% egg-hatching rate: 2000 μg mL^{-1} after 8d	97 and 98
233	Rhabdopeptide I	*Xenorhabdus budapestensis* SN84	*M. incognita*	about 30% mortality: 50 μg mL^{-1} at 48h	99
234	Rhabdopeptide J	"	"	LC_{50}=27.8±2.4 μg mL^{-1} at 48h	"
235	Rhabdopeptide K	"		LC_{50}=46.3±1.3 μg mL^{-1} at 48h	"
236	Rhabdopeptide L	"		about 38% mortality: 50 μg mL^{-1} at 48h	"
237	Rhabdopeptide M	"		LC_{50}=42.4±1.0 μg mL^{-1} at 48h	"
238	Rhabdopeptide N	"		about 40% mortality: 50 μg mL^{-1} at 48h	"
239	Rhabdopeptide O	"		about 42% mortality: 50 μg mL^{-1} at 48h	"
240	Teleocidin B4	*Streptomyces* sp. 680560	*B. xylophilus*	95% mortality: 12.5 μM after 48h; 0% egg-hatching rate: 100 μM after 48h LC_{50}=77.0 μg mL^{-1} at 48h against *M. incognita*; 88.4 μg mL^{-1} at 72h against *M. javanica*; paralyzing *H. filipjevi* at 50 μg mL^{-1}	100
241	Chaetoglobosin A	*Chaetomium globosum* NK102; *C. globosum* YSC5; *I. vitellina*	*M. incognita*; *M. javanica*; *H. filipjevi*		101, 102 and 103
242	Chaetoglobosin B	*C. globosum* YSC5; *I. vitellina*	*M. javanica*	LC_{50}=107.7 μg mL^{-1} at 72h	89 and 102
243	19-O-acetylchaetoglobosin A	*I. vitellina*	*H. filipjevi*	paralyzing nematode at 100 μg mL^{-1}	103
244	19-O-acetyl-chaetoglobosin B	"	*C. elegans*	LD_{90}=25 μg mL^{-1}	89
245	Evodiamine	*Evodia rutaecarpa*	*M. incognita*	LC_{50}=73.55 μg mL^{-1}	83
246	Rutaecarpine	"	"	LC_{50}=120.85 μg mL^{-1}	"
247	Wuchuyuamide	"	"	LC_{50}=147.87 μg mL^{-1}	"
248	*Cis*-protopinium	*Fumaria parviflora*	*M. incognita*	100% hatch inhibition and mortality: 200 mg mL^{-1} of cis- and *trans*-protopiniut over 120h	104
249	*Trans*-protopinium	"	"	"	"
250	Aristololactam W	*Aristolochia tuberosa*	*M. javanica*	LC_{50}=119.94 μg mL^{-1} at 96h	77
251	Drupacine	*Cephalotaxus fortune*	*B. xylophilus*; *M. incognita*	ED_{50}=27.1 μg mL^{-1} against *B. xylophilus* for 5d; 76.3 μg mL^{-1} against *M. incognita* at 54h	105
252	3*β*-*n*-Butylstemonamine	*Stemona parviflora*	*P. redivevus*	IC_{50}=42.5 μM at 24h	106
253	Protostemonamide	"	"	IC_{50}=1.95 μM at 24h	"
254	Protostemonine	"	"	IC_{50}=0.10 μM at 24h	"
255	(+)-Oxystemofoline	"	"	IC_{50}=76.4 μM at 24h	"
256	Stemofoline	"	"	IC_{50}=0.46 μM at 24h	"
257	Waltherione A	*Triumfetta grandidens*	*M. incognita*; *M. arenaria*; *Meloidogyne hapla* (*M. hapla*): northern root-knot nematode, one of the most economically important species of root-knot nematodes; *B. xylophillus*	LC_{50}=0.27, 0.63, 1.74, 3.54 μg mL^{-1} at 72h; 87.4% hatch inhibition: 1.25 μg mL^{-1} at 7d	107 and 108
258	Waltherione E	"	"	LC_{50}=0.09, 0.25, 0.09, 2.13 μg mL^{-1} at 72h; 91.9% hatch inhibition: 1.25 μg mL^{-1} at 7d	"
259	Waltherione C	"	"	LC_{50}=16.59, 10.67, 19.79, 790.85 μg mL^{-1} at 72h	108
260	(*Z*)-3-(4-hydroxybenzylidene)-4-(4-hydroxyphenyl)-1-methylpyrrolidin-2-one	*Orixa japonica*	*B. xylophilus*; *M. incognita*	LC_{50}=391.50, 134.51 μg mL^{-1} at 72h	109
261	Allantoin	*Adenophyllum aurantium*	*N. aberrans*	active	48
262	Gymnoascole acetate	*Gymnoascus reessii* za-30	*M. incognita*	EC_{50}=47.5 μg mL^{-1} at 24h	110
263	Ketamine	*Pochonia chlamydosporia*	*C. elegans*	ED_{50}=330 μg mL^{-1} at 48h	111
264	Prodigiosin	*Serratia marcescens*	*Radopholus similis* (*R. similis*): a burrowing nematode. Infection: crops, weeds. Control: quarantine, cultural practices, nematicides; *M.*	LC_{50}=83, 79 μg mL^{-1} at 36h	112

Number	Compound	Producer	Nematode	Activity	Reference
			javanica		
265	Fervenulin	*Streptomyces* sp. CMU-MH021	*M. incognita*	100% mortality: 250 µg mL^{-1} at 96h; 5.0±2.0% egg hatch: 250 µg mL^{-1} after 7d egg inhibitory	113
266	2′-Dehydroxy-2′-acetoxyl-clausenalansamide B	*Clausena lansium*	*P. redivevus*	IC_{50}=2750 µM at 24h	114
267	Neoclausenamide A	"	"	IC_{50}=3930 µM at 24h	"
268	Lansamide I	"	"	IC_{50}=120 µM at 24h	"
269	Clausenalansamide A	"	"	56.48±2.01 % mortality: 2500 µg mL^{-1} at 24h	115
270	3-Dehydroxy-3-methoxyl-clausenalansamide A	"	"	79.58±3.48 % mortality: 2500 µg mL^{-1} at 24h	"
271	Clausenalansamide B	"	"	21.43±3.03% mortality: 2500 µg mL^{-1} at 24h	"
272	Lansiumamide B	"	"	71.49±1.52% mortality: 2500 µg mL^{-1} at 24h	"
273	2'-Dehydroxy-2'-oxo-clausenalansamide B	"	"	16.31±0.58% mortality: 2500 µg mL−1 at 24h	"
274	*N*-2-phenylethyl-cinnamamide	"	"	20.15±1.27% mortality: 2500 µg mL−1 at 24h	"
275	Lansamide-7	"	"	46.14±4.75% mortality: 2500 µg mL−1 at 24h	"
276	Xanthomide Z	*Ophiosphaerella* sp.	*H. filipjevi*	43% mortality: 100 µg mL^{-1}	88
277	Indole-3-acetic acid (IAA)	*Fusarium oxysporum* 162	*M. incognita*	LC_{50}=117.28 µg mL^{-1} at 72h	57
278	Indole-3-acetic acid methyl ester	"	"	LC_{50}=218.57 µg mL^{-1} at 72h	"
279	Jietacin A	*Streptomyces* sp. KP-197	*C. elegans*	LD_{50}=0.42 µg mL^{-1} at 24h	116
280	Jietacin B	"	"	LD_{50}=0.32 µg mL^{-1} at 24h	"
281	Jietacin C	"	"	LD_{50}=0.27 µg mL^{-1} at 24h	"
282	Jietacin D	"	"	LD_{50}=0.80 µg mL^{-1} at 24h	"
283	1H-indole-3-carboxaldehyde	*Wautersiella falsenii* YMF 3.00141	*C. elegans*; *M. incognita*	94.0% and 72.15% mortality: 200 µg mL^{-1} at 72h	118
284	Latifolicinin A	*Cordia latifolia*	*M. incognita*	100% mortality: 0.125% at 72h	80
285	Latifolicinin B	"	"	"	"
286	Latifolicinin C	"	"	"	"
287	Latifolicinin D	"	"	"	"
288	Cordicilin	"	"	"	"
289	Rosmarinic acid	*C. latifolia*; *Zostera marina*	*M. incognita*; *B. xylophilus*	100% mortality against *M. incognita*: 0.125% at 72h LC_{50}=1180, 1050, 950 µg mL^{-1} at 24h, 48h, 72 h against *B. xylophilus*	80 and 119
290	Cordicinol	*C. latifolia*	*M. incognita*	100% mortality: 0.125% at 72h	80
291	Methyl benzoat	*Buddleja crispa*	*M. incognita*	92% mortality: 0.5% at 48h	120
292	(+)-3-Methoxy-4-hydroxy benzoic acid	"	"	40% mortality: 0.5% at 48h	"
293	3,5-Dihydroxy benzoic acid	*Rubus niveus*	*M. incognita*	96% mortality: 0.5% at 24h	121
294	Gallic acid	*R. niveus*; *Terminalia nigrovenulosa*; *Galinsoga parviflora*	*M. incognita*; *C. litoralis*	92% mortality: 0.5% at 24h against *M. incognita*; 88% hatch inhibition at 1000 µg mL^{-1} at 3d; 50% mortality: 0.5% at 48h against *C. litoralis*	39, 121 and 122
295	Ethyl galactoside	*R. niveus*	"	95% mortality: 0.5% at 24h	121
296	4-Hydroxybenzoic acid	*G. parviflora*; *F. oxysporum* 162	"	77% and 58% mortality: 0.5% at 48h; LC_{50}=104.84 µg mL^{-1} at 72h against *M. incognit*	39 and 57
297	3,4-Dihydroxybenzoic acid	*G. parviflora*; *T. nigrovenulosa*	"	79% and 40% mortality: 0.5% at 48h; 94.2% mortality at 12h and 85.0% hatch inhibition at 3d at 1000 µg mL^{-1}	39, 123 and 124
298	Salicylic acid	*Melia azedarach*	*M. incognita*	EC_{50}=379±96 µg mL^{-1} at 24h	123
299	Benzoic acid	"	"	EC_{50}=501±158 µg mL^{-1} at 24h	"
300	*p*-Coumaric acid	"	"	EC_{50}=840±196 µg mL^{-1} at 24h	"
301	Caffeic acid	*Artemisia annua*; *Ophioceras dolichostomum*	*G. rostochiensis*; *Xiphinema index* (*X. index*): a virus vector nematode. Infection: grapevine. Control: preventative measures, cultural practices, nematicides; *B. xylophilus*	84.3% mortality: 250 µg mL^{-1} at 24h against *G. rostochiensis*; 100% mortality: 125 µg mL^{-1} at 2h against *X. index*; LC_{50}=46.8 µg mL^{-1} against *B. xylophilus*	69 and 125
302	Chlorogenic acid	*A. annua*	*G. rostochiensis*; *X. index*	86.6% mortality: 250 µg mL^{-1} at 24h against *G. rostochiensis*; 75.0% mortality: 125 µg mL^{-1} at 2h against *X. index*	69
303	Isoamericanoic acid A	*O. dolichostomum*	*B. xylophilus*	LC_{50}=133.7 µg mL^{-1}	125
304	Methyl 4-hydroxybenzoate	*F. oxysporum* 162	*M. incognita*	LC_{50}=253.24 µg mL^{-1} at 72h	57

Number	Compound	Producer	Nematode	Activity	Reference
305	Methyl 2-(4-hydroxyphenyl)acetate	"	"	LC_{50}= 149.22 μg mL^{-1} at 72h	"
306	4-Hydroxyphenylacetic acid	*Oidiodendron* sp.	*P. penetrans*; *B. xylophilus*	22% and 23% mortality: 3000 μM	79
307	Rubiasin D	*Rubia* spp.	*C. elegans*	LC_{50}=8.50 μg mL^{-1}; egg hatch inhibiting LC_{50}=5.60 μg mL^{-1}	126
308	1,4-Naphthoquinone	*Rubia wallichiana*; *Rubia* spp.	*C. elegans*; *M. incognita*; *Pratylenchus thornei* (*P. thornei*): a root lesion nematode. Infection: crops, fruits, vegetables. Control: cultural practices, nematicides, biocontrol;	LC_{50}=9.44 μg mL^{-1} against *C. elegans*; LC_{50}=35.22 μg mL^{-1} against *M. incognita*; LC_{50}=161.2 μg mL^{-1} against *P. thornei*	126, 127 and 128
309	2-Methoxy-1,4-naphthoquinone	*Rubia* spp.	*C. elegans*	LC_{50}=44.82 μg mL^{-1}; egg hatch inhibiting LC_{50}=48.95 μg mL^{-1}	126
310	Methyl (*Z*)-*p*-coumarate	*Aquilaria sinensis*	*P. redivivus*	100% mortality: 2500 μg mL^{-1}	129
311	4'-Methoxycinnamic acid	"	"	100% mortality: 2500 μg mL^{-1}	"
312	Columbianetin	*Notopterygium incisum*	*B. xylophilus*; *M. incognita*	LC_{50}=103.44, 30.9 μg mL^{-1} in the dark at 72h	37
313	Isoimperatorin	"	"	LC_{50}=21.83, 17.21 μg mL^{-1} in the dark at 72h	"
314	Xanthotoxol	*Petroselinum crispum*	*M. incognita*	EC_{50}=68±33 μg mL^{-1} at 24h	130
315	Psoralen	*P. crispum*; *Ficus carica*	*M. incognita*; *B. xylophilus*; *C. elegans*; *P. redivivus*	EC_{50}=147±88 μg mL^{-1} at 24h against *M. incognita*; LC_{50}=115.03 μg mL^{-1} at 72h against *B. xylophilus*; LC_{50}= 119.40, 181.1 μg mL^{-1} at 72h against *C. elegans* and *P. redivivus*	130, 131 and 132
316	Xanthotoxin	*P. crispum*	*M. incognita*	EC_{50}=200±21 μg mL^{-1} at 24h	130
317	Apiol	"	"	EC_{50}=766±67 μg mL^{-1} at 24h	"
318	Myristicin	"	"	EC_{50}=812±83 μg mL^{-1} at 24h	"
319	Bergapten	*F. carica*	*B. xylophilus*	LC_{50}=97.08 μg mL^{-1} at 72h	131
320	Umbelliferone	*Stellera chamaejasme*	*B. xylophilus*; *B. mucronatus*	LC_{50}=3.3, 33.4 μM at 72h	34
321	Daphnoretin	"	"	LC_{50}=65.3, 0.05 μM at 72h	"
322	Stemanthrene A	*Stemona parviflora*	*M. incognita*	IC_{50}=17.10±0.65 μM at 24h	28
323	4-Hydroxy-benzenepropanol-α-benzoate	"	"	IC_{50}=4.22±0.31 μM at 24h	"
324	(*E*)-4-hydroxycinnamic acid methyl ester	"	"	IC_{50}=1.07±0.05 μM at 24h	"
325	1,2,3,4,6-Pentagalloyl glucose	*Schinus terebinthifolius*	*M. incognita*	34.0% eggs hatch: 200 μg mL^{-1} at 10d; 21.0% mortality: 200 μg mL^{-1} at 72h	133
326	Methylgallate	"	"	42.0% eggs hatch: 200 μg mL^{-1} at 10d; 13.0% mortality: 200 μg mL^{-1} at 72h	"
327	Protocatechuic acid	"	"	41.0% eggs hatch: 200 μg mL^{-1} at 10d; 13.0% mortality: 200 μg mL^{-1} at 72h	"
328	Punicalagin	*Punica granatum*	*B. xylophilus*	LC_{50}=307.08 μM at 72h	134
329	Punicalin	"	"	LC_{50}=826.96 μM at 72h	"
330	Corilagin	"	"	LC_{50}=868.28 μM at 72h	"
331	1,3,8,9-Tetrahydroxydibenzo[*b*,*d*]pyran-6-one	*Eucalyptus exserta*	*M. incognita*	91.8 ± 4.01% mortality: 100 μg mL^{-1} at 48 h	41
332	2,6-Dimethoxy-1,4-benzoquinone	"	"	72.4 ± 2.07 % mortality: 100 μg mL^{-1} at 48 h	"
333	3,3′-Di-O-methylellagic acid	"	"	61.5 ± 2.05 % mortality: 100 μg mL^{-1} at 48 h	"
334	Yangambin	"	"	81.1 ± 4.43 % mortality: 100 μg mL^{-1} at 48 h	"
335	Flavipin	*C. globosum* YSC5	*M. javanica*	LC_{50}=99.2 μg mL^{-1} at 72h	102
336	3-Methoxyepicoccone	"	"	LC_{50}=124.0 μg mL^{-1} at 72h	"
337	4,5,6-Trihydroxy-7-methylphthalide	"	"	LC_{50}=131.6 μg mL^{-1} at 72h	"
338	Sparassol	*Sparassis latifolia*	*B. xylophilus*	LC_{50}=84.92 μg mL^{-1} at 24h; LC_{95}=132.13 μg mL^{-1} at 24h	135
339	Isocoumarin	*Streptomyces* sp. CMU-MH021	*M. incognita*	weak activity	113
340	4-Oxabicyclo[3.2.2]nona-1(7), 5,8-triene	*Bacillus* sp. SMrs28	*B. xylophilus*; *D. destructor*	LC_{50}=904.12, 1594.0 μg mL^{-1} at 72h	95
341	Phenylacetamide	"	"	LC_{50}=232.98, 206.38 μg mL^{-1} at 72h	"
342	1,5-Dimethyl citrate hydrochloride ester	*Aspergillus japonicus* ZW1	*M. incognita*	91.7±0.5% mortality: 1250 μg mL^{-1} at 48h	136
343	Kojic acid	*Aspergillus oryzae*	*M. incognita*	mortality: EC_{50}=195.2 μg mL^{-1} at 72h egg hatch inhibition: EC_{50}=238.3 μg mL^{-1} at 72h	137
344	*trans*-Aconitic acid (TAA)	*Bacillus thuringiensis* CT-43	*M. incognita*	LC_{50}=226.3 μg mL^{-1} at 72h	138

Table S2 The genetic manipulation of *Streptomyces* spp.

Genes	Strains	Genetic manipulation	Content change	Product	Reference
malEFG-a	*Streptomyces avermitilis*	Knockout	Lost	No product	166
		Overexpression	Increased 2.6-3.2 folds	Avermectin	
	S. avermitilis OI-31	Overexpression	Increased 2.6-3.3 folds	Ivermectin	
rpp gene cluster	*S. avermitilis* AV-LP	Knockout	Increased 24%	Avermectin	167
ribosomal recycling factor (RRF)	*S. avermitilis*	Overexpression	Increased 3-3.7 folds	Avermectin	168
metK	*S. avermitilis*	Overexpression	Increased 2.0-5.5 folds	Avermectin	169
fadAB	*S. avermitilis*	Overexpression	Increased 1.7-3.8 folds	B1a	171
	S. avermitilis A229	Overexpression	Increased 31%	B1a	
fadD	*S. avermitilis*	Overexpression	Increased 24%	B1a	
	S. avermitilis A229	Overexpression	Increased 15%	B1a	
sco6196	*S. avermitilis* A56	Overexpression	Increased 50 % in 180 m^3 bioreactor	B1a	172
olmRI and *olmRII*	*S. avermitilis*	Both Knockout	Increased 4 folds	Avermectin	174
aveR	*S. avermitilis*	Knockout	Lost	Avermectin	176
	S. avermitilis	Overexpression	Increased about 1.0 fold		
ohrdB	*S. avermitilis* A56	Mutant *hrdB* gene	Increased 53%	B1a	177
avaR1		Knockout	Increased 1.75 folds	B1a	180
avaR2	*S. avermitilis*	Knockout	Increased 1 folds	Avermectin	181
avaR3		Knockout	Decreased to 1%	Avermectin	182
aveT	*S. avermitilis*	Overexpression	Increased 1.2 folds	Avermectin	183
	S. avermitilis A-178		Increased 22%		
aveM	*S. avermitilis*	Knockout	Increased 3.5 folds		
	S. avermitilis A-178		Increased 42%		
SAV7471	*S. avermitilis*	Overexpression	Decreased 75%	Avermectins	18
SAV151	*S. avermitilis*	Overexpression	Decreased 70%	Avermectin	185
		Knockout	Increased 1.0 folds		
SAV576	*S. avermitilis*	Knockout	Increased 1.3 folds	Avermectin	186
SAV577	*S. avermitilis*	Overexpression	Decreased 52.6%	Avermectin	187
sig6	*S. avermitilis*	Knockout	Increased 2-2.7 folds	Avermectin	188
sig25	*S. avermitilis*	Knockout	Increased 1.23 fold	Avermectin	189
sig8	*S. avermitilis*	Knockout	Increased 96%	Avermectin	190
		Overexpression	Decreased 50 %		
phoP	*S. avermitilis*	Knockout	Increased 2 fold	B1	191
glnR	*S. avermitilis*	Knockout	Lost	B1a	192
sav_742	*S. avermitilis*	Knockout	Increased 49%	Avermectin	193
sav_4189	*S. coelicolor*	Overexpression	Increased 2.5 fold	Avermectin	194
	S. coelicolor A-144	Overexpression	Increased 21%		
ohrR	*S. avermitilis*	Knockout	Increased 2 folds	Avermectin	195
rex	*S. avermitilis*	Overexpression	Decreased to 33 %	Avermectin	196
		Knockout	Increased 3 folds		
soxR	*S. avermitilis*	Overexpression	Increased 2.4 folds	Avermectin	197
	S. avermitilis A229	Overexpression	Increased 14-16 %		
zur	*S. avermitilis*	Overexpression	Increased 120%	B1a	198
hspR	*S. avermitilis*	Overexpression	Increased 154%	Avermectin	199

	S. avermitilis A229	Overexpression	Increased 14%–17%	B1a	
bldDsav	*S. avermitilis*	Overexpressing	Increased 106%	Avermectin	200
avtAB	*S. avermitilis*	Overexpression	Increased 50%	B1a	201
TuPPE modules	*S. avermitilis* NEAU12	Expression	Increased 53.0%	B1a	202
aveDH2-KR2	*S. avermitilis* NA-108	Replaced with *milDH2-ER2-KR2*	Increased	B1a	15
aveLAT-ACP	*S. avermitilis* AVE-T27	Replaced with *milLAT-ACP*	New avermectins	25-Ethyl and 25-methyl ivermectin	15
*aveA1*and *aveA3*	*S. avermitilis* SA-01,	Replaced with *MilA1* and *MilA3*	Increased	Milbemycin	203
Ave polyketide synthase (PKS)	*S. avermitilis* TG2002	Replaced with CHC-CoA	Increased 6 fold	Doramectin	204
81-kb avermectin biosynthetic gene cluster	*Streptomyces coelicolor*	Heterologous expression	Detected	Avermectin	207
ave (81 Kb)	*Streptomyces lividans*	Heterologous expression	Detected	Avermectin	208
the DH-KR domain of the avermectin PKS module 2 was replaced with MEI DH2-ER2-KR2	*S. lividans*	Heterologous biosynthesis	Detected	Ivermectins B1a, A1a	209