

SUPPLEMENTARY FILES

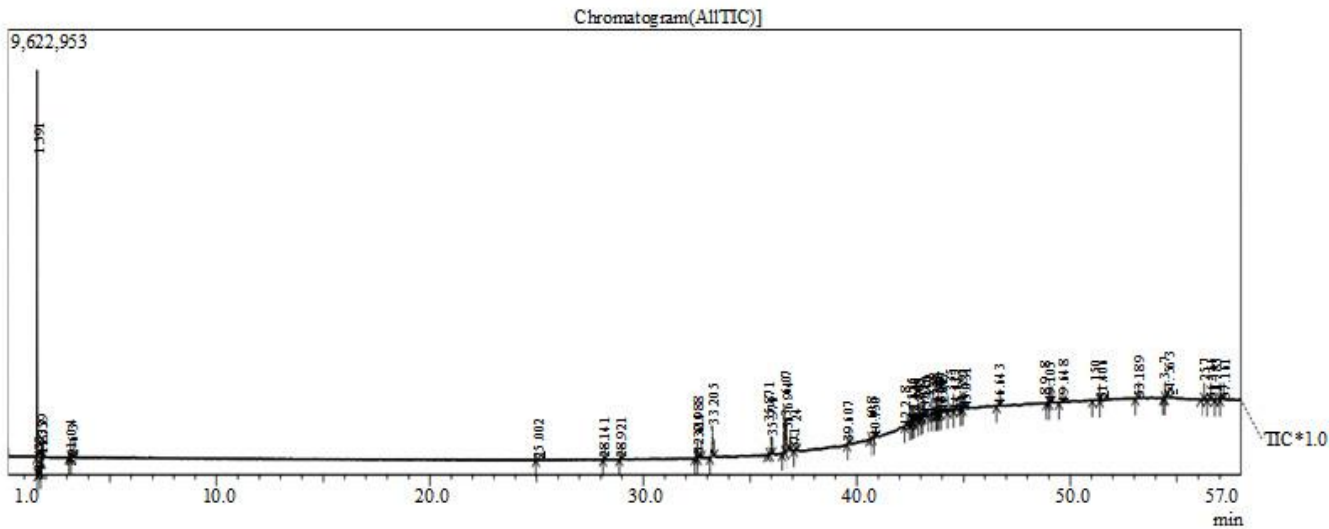
Harnessing Antimicrobial Activities of *Azotobacter* and *Bacillus* Species for Suppression of Root Rot Disease in Sugar-beet

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Table S1 GC/MS quantitative analysis of the *Azotobacter chroococum* (B1) extract as total volatile bioactive metabolites

Peak	R.Time	Area	Area%	Height	Height%	Name
1	1.591	8771041	28.27	8671619	60.40	Acetonitrile
2	1.633	220044	0.71	46297	0.32	5-Imidazolic acid, 2-[4-bromophenylaz
3	1.759	1136830	3.66	453543	3.16	Zirconium, dichloro[(dimethylsilylene)b
4	1.833	166403	0.54	83768	0.58	Butanal, 3-methyl-
5	3.104	212975	0.69	84365	0.59	2,3-Butanediol, [S-(R*,R*)]-
6	3.263	72572	0.23	22017	0.15	2,3-Butanediol, [R-(R*,R*)]-
7	25.002	63927	0.21	26081	0.18	1-Hexadecanol
8	28.141	65504	0.21	26574	0.19	Methyl tetradecanoate
9	28.921	114634	0.37	33729	0.23	Tetradecanoic acid
10	32.488	1260428	4.06	413098	2.88	Hexadecanoic acid, methyl ester
11	32.619	273204	0.88	57282	0.40	2,5-Piperazinedione, 3,6-bis(2-methylpr
12	33.205	2360073	7.61	679089	4.73	n-Hexadecanoic acid
13	35.871	2196549	7.08	717795	5.00	9,12-Octadecadienoic acid (Z,Z)-, meth
14	35.976	1213509	3.91	386700	2.69	9-Octadecenoic acid (Z)-, methyl ester
15	36.607	3681530	11.86	972233	6.77	9,12-Octadecadienoic acid (Z,Z)-
16	36.694	3137551	10.11	707345	4.93	Oleic Acid
17	37.124	109362	0.35	29165	0.20	[1,1'-Bicyclopropyl]-2-octanoic acid, 2'
18	39.607	142711	0.46	46296	0.32	Stearic acid, 2-hydroxy-1-methylpropyl
19	40.608	90407	0.29	21561	0.15	n-Hexadecanoic acid
20	40.750	104300	0.34	20495	0.14	Ethene, 1,1'-[oxybis(2,1-ethanedioxy)]
21	42.258	68172	0.22	6549	0.05	2-[2-[2-[2-[2-[2-[2-[2-(2-Methox
22	42.565	354414	1.14	107290	0.75	9,12-Octadecadienoic acid (Z,Z)-
23	42.620	280540	0.90	85668	0.60	2-Propenoic acid, tridecyl ester
24	42.808	252699	0.81	24761	0.17	Tetraethylene glycol
25	42.905	104887	0.34	30030	0.21	N,N-Dimethylformamide ethylene aceta
26	43.050	102193	0.33	20214	0.14	Ethanol, 2-(vinylloxy)-
27	43.140	91908	0.30	29573	0.21	Glycerol 1-palmitate
28	43.392	166949	0.54	18451	0.13	15-Crown-5
29	43.558	225460	0.73	23583	0.16	Imidodicarbonic acid, diethyl ester
30	43.725	179711	0.58	34066	0.24	Heptane, 1-(ethenylthio)-
31	43.800	82077	0.26	43486	0.30	1,4,7,10,13,16-Hexaoxacyclooctadecan
32	43.857	368867	1.19	74878	0.52	Diisooctyl phthalate
33	44.067	580688	1.87	27649	0.19	1-Octanamine, N-methyl-N-nitro-
34	44.335	541204	1.74	48996	0.34	Heptaethylene glycol
35	44.617	129885	0.42	11822	0.08	Imidodicarbonic acid, diethyl ester
36	44.892	80015	0.26	13675	0.10	Acetic acid, [(aminocarbonyl)amino]ox
37	45.031	113192	0.36	24826	0.17	8,9,9,10,10,11-Hexafluoro-4,4-dimethy
38	46.643	172442	0.56	27236	0.19	2-Hydroxyhexadecyl butanoate
39	48.908	94648	0.31	11243	0.08	1,3,4-Trimethoxy-butan-2-ol
40	49.105	115010	0.37	21054	0.15	Carbamothioic acid, dipropyl-, S-propyl
41	49.648	119609	0.39	10428	0.07	2-Formylhistamine
42	51.150	234694	0.76	13442	0.09	N-(2-Aminoethyl)-N-methylethylenedia
43	51.406	109860	0.35	22139	0.15	2-Hexenal, 5-(1-ethoxyethoxy)-, [R*,S*
44	53.189	82875	0.27	12334	0.09	12-Crown-4
45	54.367	115914	0.37	16113	0.11	Silane, diethylmethyl-

46	54.563	546634	1.76	53493	0.37	2-[2-[2-[2-[2-(2-Hydroxyethoxy)
47	56.257	74015	0.24	9860	0.07	1,3-Dioxolane, 4-methyl-
48	56.566	82126	0.26	13592	0.09	Dihydroxymaleic acid
49	56.783	72465	0.23	10697	0.07	2-Oxoacetic acid, ethyl ester, oxime
50	57.161	92126	0.30	11051	0.08	N,N-Dimethylformamide trimethylene a



18	35.869	3305554	3.67	1085814	4.37	9,12-Octadecadienoic acid (Z,Z)-, meth
19	35.974	1988329	2.21	628022	2.53	9-Octadecenoic acid (Z)-, methyl ester
20	36.617	6224969	6.91	1537887	6.19	9,12-Octadecadienoic acid (Z,Z)-
21	36.701	6072637	6.74	1251929	5.04	Oleic Acid
22	37.098	1142805	1.27	121118	0.49	Octadecanoic acid
23	37.210	552104	0.61	112962	0.45	2-Ethyl-n-butyric acid ethyl ester
24	37.371	688169	0.76	117925	0.47	Tetraethylene glycol
25	37.846	834671	0.93	203490	0.82	Tetraethylene glycol
26	37.973	281611	0.31	81344	0.33	2,2'-Bi-1,3-dioxolane
27	39.397	825353	0.92	208182	0.84	2(3H)-Furanone, dihydro-5-tetradecyl-
28	39.722	332593	0.37	30185	0.12	2,4-Bis(hydroxylamino)-5-nitropyrimid
29	40.223	767626	0.85	220752	0.89	2H-Pyran-2-one, tetrahydro-6-tridecyl-
30	40.600	5627806	6.24	1484662	5.97	n-Hexadecanoic acid
31	40.901	596638	0.66	62730	0.25	4-Methyl-5-decanol
32	41.975	439915	0.49	56310	0.23	Octaethylene glycol monododecyl ether
33	42.186	250361	0.28	77770	0.31	Methyl .beta.-d-ribofuranoside
34	42.339	1684569	1.87	262117	1.05	Eicosanoic acid, 2-hydroxyethyl ester
35	42.575	1118572	1.24	114261	0.46	Propane, 2,2'-(ethylidenebis(oxy))bis-
36	42.617	1026780	1.14	126030	0.51	1-Methoxy-3-(trimethylsilyloxymethyl)
37	42.750	343166	0.38	139591	0.56	Propane, 1-(1-ethoxyethoxy)-
38	42.832	1244518	1.38	244325	0.98	2(3H)-Furanone, dihydro-5-tetradecyl-
39	43.023	1508128	1.67	175541	0.71	12-Crown-4
40	43.148	2440608	2.71	216706	0.87	Oxirane, tetradecyl-
41	43.267	328130	0.36	175173	0.70	3-Deoxy-d-mannonic lactone
42	43.408	3015358	3.35	177355	0.71	15-Crown-5
43	43.721	4237345	4.70	732018	2.95	Octadecanoic acid
44	43.849	2316999	2.57	374172	1.51	Pentaethylene glycol
45	44.027	1705149	1.89	283185	1.14	Pentaethylene glycol
46	44.108	412178	0.46	172441	0.69	6-Oxa-3-thiaoctanoic acid
47	44.202	9034914	10.03	1718035	6.91	Oleic Acid
48	44.542	1309966	1.45	269955	1.09	Diisooctyl phthalate
49	45.108	4396940	4.88	910342	3.66	9,12-Octadecadienoic acid (Z,Z)-
50	53.358	1236254	1.37	97971	0.39	Heptaethylene glycol

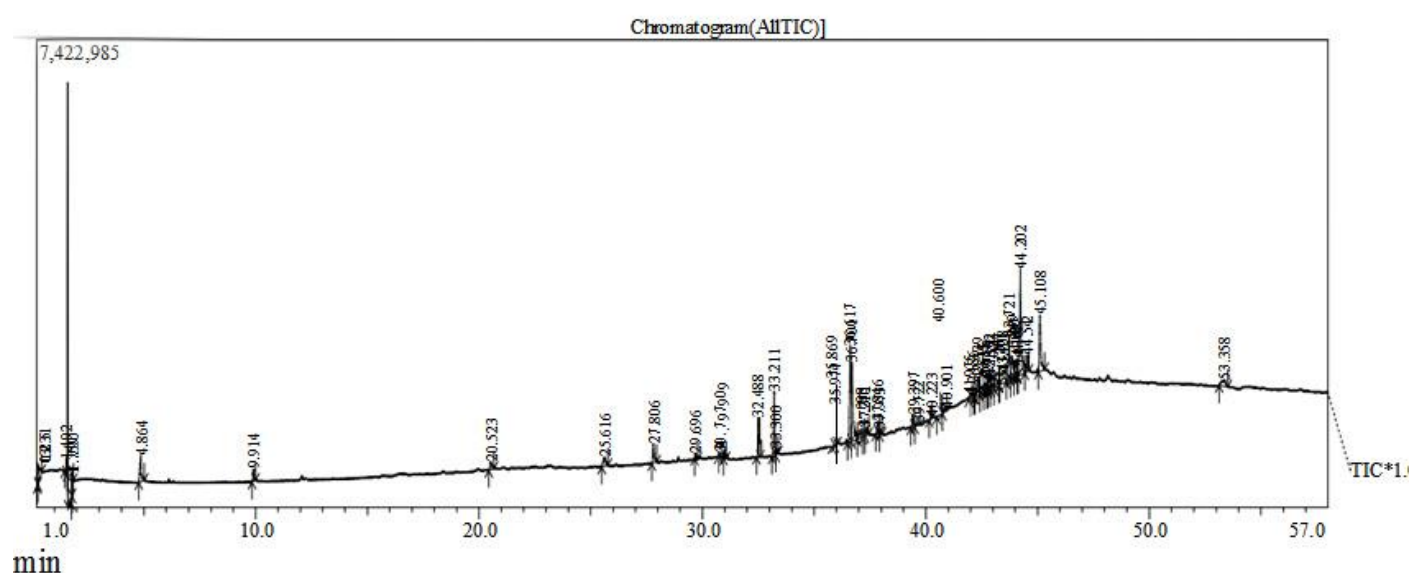


Fig. S2 A chromatogram of GC/MS showing the total volatile bioactive compounds of extract of *Bacillus megaterium* (B2)

Table S3 GC/MS quantitative analysis of the *Bacillus velezensis* (B3) extract as total volatile bioactive metabolites

Peak	R.Time	Area	Area%	Height	Height%	Name
1	1.650	218326	1.99	43639	1.66	5(S),9(S),10(S)-15,16-Epoxycyclohexa-3,
2	1.767	624528	5.69	399076	15.18	2,3,5,6-Tetrachloro-N-bis(trimethylsilyl)
3	12.035	113563	1.04	39384	1.50	2-Butanol, 3-methyl-
4	32.482	218184	1.99	77003	2.93	Hexadecanoic acid, methyl ester
5	33.177	516770	4.71	142059	5.40	n-Hexadecanoic acid
6	35.864	318227	2.90	101904	3.88	9,12-Octadecadienoic acid, methyl este
7	35.968	186155	1.70	60777	2.31	9-Octadecenoic acid (Z)-, methyl ester
8	36.573	594451	5.42	164379	6.25	9,12-Octadecadienoic acid (Z,Z)-
9	36.661	662899	6.04	125977	4.79	Oleic Acid
10	37.114	189810	1.73	22234	0.85	Methoxyacetic acid, 10-undecenyl ester
11	39.602	176210	1.61	38949	1.48	Stearic acid, 2-hydroxy-1-methylpropyl
12	42.567	724841	6.61	98276	3.74	Linoleic acid ethyl ester
13	42.742	664046	6.05	95975	3.65	Ethene, (2-methoxyethoxy)-
14	43.050	572299	5.22	117366	4.46	2- <i>t</i> -Butyl-4-methyl-5-oxo-[1,3]dioxolan
15	43.092	238214	2.17	120162	4.57	2-Propanol, 1,1'-oxybis-
16	43.138	361052	3.29	121921	4.64	1,3,3-Trimethoxybutane
17	43.869	775078	7.07	147606	5.61	12-Crown-4
18	44.092	810362	7.39	121026	4.60	2,5,8,11,14-Pentaoxahexadecan-16-ol
19	44.327	953893	8.70	125955	4.79	Heptaethylene glycol
20	44.583	617926	5.63	92543	3.52	3-Bromobutyric acid
21	44.802	275844	2.52	85733	3.26	1,4,7,10,13,16-Hexaoxacyclooctadecan
22	44.883	194848	1.78	79554	3.03	Benzeneethanamine, 4-chloro-.alpha.-m
23	44.925	403122	3.68	80998	3.08	Germacyclobutane, 1,1-dimethyl-
24	45.240	163358	1.49	57558	2.19	2-[2-[2-[2-[2-[2-[2-(2-Methoxyet
25	47.945	169648	1.55	42912	1.63	Pentaethylene glycol
26	52.027	223498	2.04	26799	1.02	1,4,7,10,13,16-Hexaoxacyclooctadecan

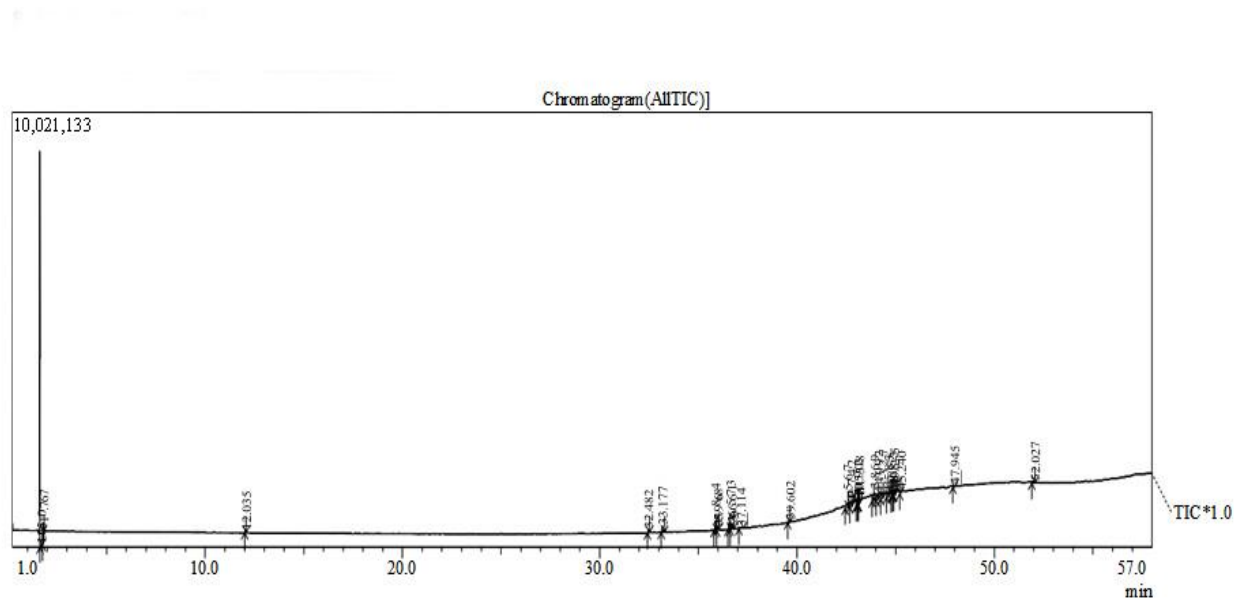


Fig. S3 A chromatogram of GC/MS showing the total volatile bioactive compounds of extract of *Bacillus velezensis* (B3)