

# ***Smilax aspera* L. Leaf and Fruit Extracts as Antibacterial Agents for Crop Protection**

**Riccardo Fontana<sup>1</sup>, Eva Sánchez-Hernández<sup>2</sup>, Pablo Martín-Ramos<sup>2,\*</sup>, Jesús Martín-Gil<sup>2</sup>, and Peggy Marconi<sup>1,3</sup>**

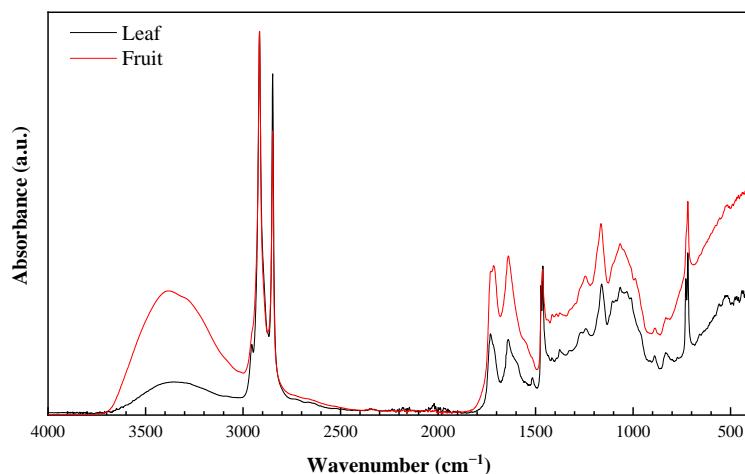
<sup>1</sup> Department of Chemical, Pharmaceutical and Agricultural Sciences, University of Ferrara, 44121 Ferrara, Italy; fntrcr1@unife.it (R.F.), peggy.marconi@unife.it (P.M.)

<sup>2</sup> Department of Agricultural and Forestry Engineering, ETSIIAA, Universidad de Valladolid, 34004 Palencia, Spain; eva.sanchez.hernandez@uva.es (E.S.-H.), jesus.martin.gil@uva.es (J.M.-G.)

<sup>3</sup> Laboratory for the Technology of Advanced Therapy (LTTA), Technopole of Ferrara, Ferrara 44121, Italy

\* Correspondence: pmr@uva.es (P.M.-R.)

## **SUPPLEMENTARY MATERIAL**



**Figure S1.** ATR-FTIR spectra of *S. aspera* leaves and fruits prior to extraction.

**Table S1.** Phytochemicals identified in *S. aspera* hydromethanolic leaf extract.

RT (min)	Area (%)	Chemical Species	Qual
3.5319	1.0699	Ethylamine	35
3.5794	3.4987	Oxalic acid	56
3.6743	24.6513	Acetic acid	91
3.8702	17.4389	2-Propanone, 1-hydroxy-	80
4.3153	1.6072	Butanenitrile, 2,3-dioxo-, dioxime, O,O'-diacetyl-	40
4.4044	3.4758	2,3-Butanediol	86
5.2175	2.0965	Oxime-, methoxy-phenyl-	80
5.3006	0.8889	Dihydroxyacetone	64
5.4727	1.6072	2(5H)-Furanone	58
5.5677	0.2709	1,4-Butanediol	38
5.6211	2.1435	2-Cyclopenten-1-one, 2-hydroxy-	86
6.1969	0.8402	Phenol	95
6.3274	0.6158	Diglycerol	64
6.4105	5.3028	2-Hydroxy- $\gamma$ -butyrolactone	40
6.5292	1.3268	Lactic acid, monoanhydride with 1-butaneboronic acid, cyclic ester	47
6.8319	1.0994	Cyclohexanone, 2-methyl-	59
6.9922	0.3296	Benzyl alcohol	93
7.0337	0.3907	Acetic acid, 3-ethoxy-4,5-dihydroisoxazol-5-ylmethyl ester	25
7.1524	0.5328	2-Butanone, 4-hydroxy-3-methyl-	58
7.2652	0.6265	2,5-Dimethyl-4-hydroxy-3(2H)-furanone	62
7.7282	0.3785	Mequinol	68
7.9003	3.2450	Cyclopropyl carbinol	50
8.4819	0.5094	2-Propanamine, N-methyl-N-nitroso-	42
8.6303	1.6806	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-	93
8.8559	1.1010	Benzoic acid	95
9.0933	0.6587	5-Chloro-2,6-dimethyl-4-pyrimidinylamine	64
9.2773	0.4283	Glycyl-L-valine, N-dimethylaminomethylene-, methyl ester	59
9.4791	2.3259	Catechol	95
9.6987	1.2231	Benzofuran, 2,3-dihydro-	68
10.3397	0.5499	1,2-Benzenediol, 3-methyl-	94
10.4821	0.2987	Ethanol, 2-[2-(2-ethoxyethoxy)ethoxy]-	64
10.7196	0.5246	3-Isobutylidihydropyrazin-2-one	43
10.7433	0.2678	3-Cyclopenten-1-one, 2,2,5,5-tetramethyl-	52
10.9985	1.1312	2-Methoxy-4-vinylphenol	90
11.4733	0.2798	Phenol, 2,6-dimethoxy-	93
11.5624	0.3547	Eugenol	95
12.1381	0.1751	1-(3,6,6-Trimethyl-1,6,7,7a-tetrahydrocyclopenta[c]pyran-1-yl)ethanone	93
12.8266	0.6675	Phenol, 2-methoxy-6-(2-propenyl)-	42
13.5091	1.0664	D-Allose	49
14.1917	0.2424	1,3-Benzenedicarboxylic acid, 5-methyl-	43
14.2273	0.4045	1-Adamantyl methyl ketone	50
14.5003	4.1825	$\alpha$ -D-Galactopyranoside, methyl	86
14.6072	1.0582	$\beta$ -D-Glucopyranoside, methyl	47
15.0464	4.5408	D-Fucose	43
15.6696	0.3619	Cyclopentanol, 2-cyclopentylidene-	86
15.7883	0.3153	Phenol, 2,6-dimethoxy-4-(2-propenyl)-	60

**Table S2.** Phytochemicals identified in *S. aspera* hydromethanolic fruit extract.

RT (min)	Area (%)	Chemical Species	Qual
3.2472	31.5657	Acetic acid	91
3.4431	4.7791	2-Propanone, 1-hydroxy-	64
3.4965	0.1856	Methyl formate	43
3.5796	0.7025	Acetic acid, hydroxy-, methyl ester	90
4.0841	2.8061	2,3-Butanediol, [R-(R*,R*)]-	86
4.1553	0.4638	2,3-Butanediol	43
4.3215	0.6991	3-Butenoic acid	89
4.4699	3.6702	2-Furanmethanol	98
4.9566	2.2513	Diisopropyl ether	72
5.1880	0.9433	Dihydroxyacetone	72
5.3008	0.2839	4-Trifluoroacetoxyoctane	38
5.3720	1.3955	2(5H)-Furanone	86
5.4017	1.2199	Butyrolactone	87
5.4848	1.5040	2-Cyclohexen-1-ol	52
5.5560	4.1335	2-Cyclopenten-1-one, 2-hydroxy-	87
6.1199	0.5389	Sulfurous acid, isoheptyl 2-propyl ester	27
6.3336	0.2586	Furan, 2,3-dihydro-4-methyl-	80
6.4701	2.2381	2-Hydroxy-γ-butyrolactone	38
6.8915	1.6307	Proline, 3,4-didehydro-	47
7.1348	0.3394	β-D-Ribopyranoside, methyl, 3-acetate	25
7.1823	0.2985	1H-Azepin-1-amine, hexahydro-	55
7.3723	0.2597	3-Isothiazolecarboxamide	50
7.4316	0.3136	2-Propenamide	50
7.7343	0.4553	3-Methoxycarbonylpyrazole	72
7.9658	10.5218	2(3H)-Furanone, dihydro-4-hydroxy-	56
8.1616	0.4471	Maltol	64
8.5000	0.2560	2-Propanamine, N-methyl-N-nitroso-	52
8.6721	0.3626	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-	87
8.8323	0.3540	Benzoic acid	96
8.9451	3.0371	1,3-Dioxolane-4-methanol	64
9.4496	5.9550	Catechol	96
9.6929	0.5009	Benzofuran, 2,3-dihydro-	46
9.7345	0.2409	Ethanol, 2-phenoxy-	38
10.3102	0.7109	1,2-Benzenediol, 3-methyl-	86
10.5417	0.2461	Resorcinol, 2-acetyl-	81
10.7672	1.6456	L-Alanine, N-(2-furoyl)-, propyl ester	45
11.0047	0.4798	2-Methoxy-4-vinylphenol	64
11.1887	0.2130	Sulfurous acid, di(2-methyl-4-methoxybutyl) ester	38
14.1326	0.1377	1,2,4-Triazin-5(2H)-one, 3,4-dihydro-3-thioxo-	20
14.2394	0.4073	3,4-methylenedioxyphenyl-1-propanal	52
15.1178	1.9184	D-Fucose	27
15.6401	0.5657	Hexanoic acid, 9-decen-1-yl ester	22
16.0318	0.2590	Methyl tetradecanoate	95
17.1121	0.1443	Methyl 9-methyltetradecanoate	78
17.9134	0.3401	13-Borabicyclo[7.3.0]tridecane, 13-propoxy-, (Z)- or (E)-	25
18.1448	1.9822	Hexadecanoic acid, methyl ester	99
18.5425	0.4606	2H-1-Benzopyran, 6,7-dimethoxy-2,2-dimethyl-	64
19.7770	0.7825	9,12-Octadecadienoic acid, methyl ester	99
19.8364	2.7956	11-Octadecenoic acid, methyl ester	99
20.0679	0.2995	Heptadecanoic acid, 16-methyl-, methyl ester	98