

Supplementary Material

Simulated fire injury: effects of trunk girdling and partial defoliation on reproductive development of apple trees (*Malus domestica*)

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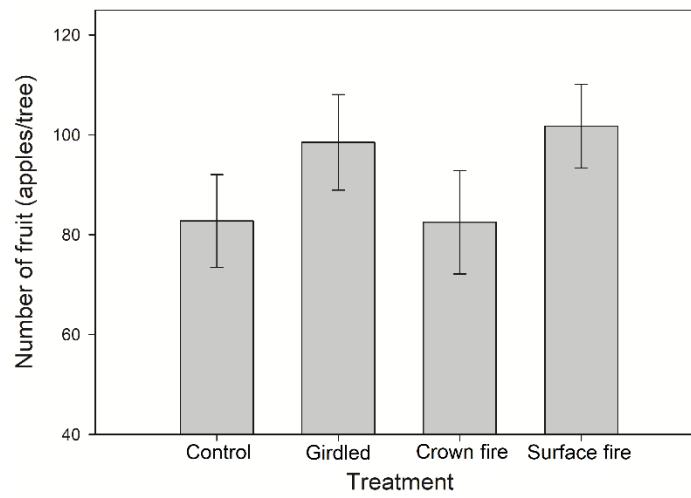
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Journal:

Trees: Structure and Function

Online Resource 1:



Effects of control, trunk girdling, simulated crown fire and simulated surface fire treatments on on average number of fruit present per tree at harvest (22 weeks after fruit set) (mean \pm SE; n = 4)

Online Resource 2:

Impact of control, trunk girdling, simulated crown fire and simulated surface fire treatments on apple flesh and peel primary metabolite abundance (relative concentration calculated from the normalised peak area) at harvest. The GC/MS retention time, major fragment m/z, retention index, and the NIST library corresponding compound information are included.

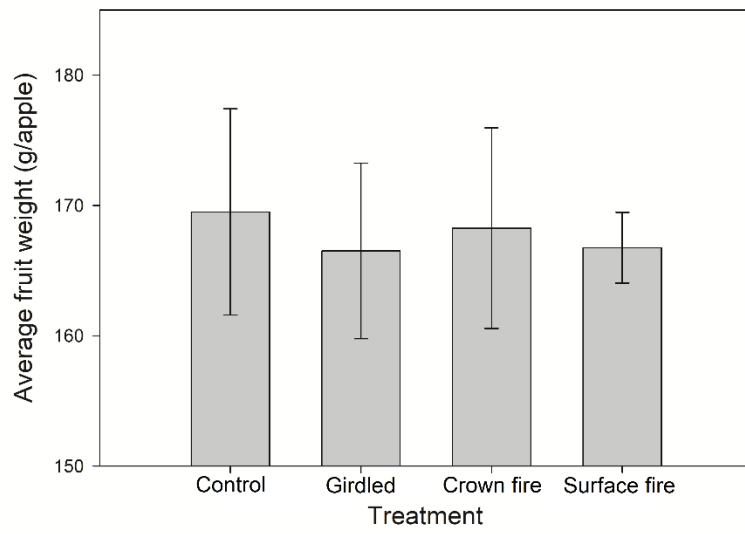
Metabolite	Treatment	Relative abundance (Fruit flesh)		Relative abundance (Peels)		RT (min)	m/z	Kegg ID	NIST library compound	Retention index
		Mean	SE	Mean	SE					
Malic acid	Control	2972.618		116.9276		86.13307				
	Girdled	3381.867		278.0171		1614.539				
	Crown fire	2677.871		222.8679		1389.119				
	Surface fire	2603.929		153.8788		1430.629				
Fructose	Control	13348.24		2082.304		3460.340				
	Girdled	14584.08		2717.708		3454.681				
	Crown fire	11805.98		3553.323		2874.985				
	Surface fire	13222.96		2316.524		2851.196				
Glucose	Control	550.0408		152.6131		282.5039				
	Girdled	737.7877		110.3821		296.0811				
	Crown fire	340.7779		224.0491		288.9070				
	Surface fire	87.4840		4.7955		350.6592				
Sorbitol	Control	1784.869		137.7501		1093.464				
	Girdled	2469.753		454.0911		1093.052				
	Crown fire	1445.864		250.6701		1160.808				
	Surface fire	1202.311		130.2277		798.454				
Sucrose	Control	35649.98		6168.445		7905.522				
	Girdled	41033.06		8725.781		7113.252				
	Crown fire	31099.25		10240.32		6428.901				
	Surface fire	35109.39		6764.57		6148.229				
Lactic acid	Control	2.113291		0.109186		1.693238				
	Girdled	1.914024		0.038680		1.774546				
	Crown fire	1.997473		0.071910		1.637866				
	Surface fire	1.715741		0.281973		1.633184				
Glycolic acid	Control	1.099633		0.041404		0.762098				
	Girdled	0.997486		0.038220		0.887226				
	Crown fire	1.206477		0.062968		1.096366				
	Surface fire	1.276809		0.022655		1.010853				
Valine	Control	0.032081		0.005406		0.022879				
	Girdled	0.026372		0.006226		0.023668				
	Crown fire	0.028127		0.007029		0.032361				
	Surface fire	0.023062		0.006113		0.025928				
Alanine	Control	0.233291		0.137663		1.173939				
	Girdled	0.173579		0.046065		1.171154				
	Crown fire	0.408153		0.164005		1.114099				
	Surface fire	0.137995		0.039998		1.152226				
Leucine	Control	0.165619		0.014321		0.069836				
	Girdled	0.159973		0.018235		0.074776				
	Crown fire	0.182446		0.013041		0.071228				
	Surface fire	0.192756		0.024959		0.071827				
Benzoic acid	Control	0.494281		0.039835		1.027947				
	Girdled	0.441823		0.032465		0.951863				
	Crown fire	0.641696		0.119484		0.902081				
	Surface fire	0.561515		0.025257		1.078614				
Malonic acid	Control	0.253135		0.012818		0.123267				
	Girdled	0.241163		0.018724		0.136622				
	Crown fire	0.232511		0.015349		0.110126				
	Surface fire	0.213562		0.012545		0.124964				
Urea	Control	0.425903		0.131364		0.013089				
	Girdled	0.220170		0.147866		0.034809				
	Crown fire	0.212003		0.076845		0.034219				
	Surface fire	0.330461		0.227707		0.033969				
Serine	Control	1.301163		0.076260		0.354258				
	Girdled	1.474299		0.261178		0.333702				
	Crown fire	1.239062		0.093271		0.289725				
	Surface fire	1.391340		0.299442		0.316875				
Isoleucine	Control	0.139500		0.006782		0.089844				
	Girdled	0.163316		0.018497		0.103528				
	Crown fire	0.160413		0.011465		0.097605				
	Surface fire	0.148127		0.018991		0.094934				
Proline	Control	0.016130		0.004941		0.003217				
	Girdled	0.026759		0.006640		0.006605				
	Crown fire	0.017754		0.005116		0.004988				
	Surface fire	0.016681		0.008300		0.004470				
Maleic acid	Control	53.22708		6.565373		26.91351				
	Girdled	49.24758		6.488469		27.45940				
	Crown fire	44.96378		7.442352		24.57875				
	Surface fire	48.88056		10.330297		20.59704				

Succinic acid	Control	3.761487	0.289778	3.181787	0.264381	10.07	147.1	C00042	Succinic acid (2TMS)	1322
	Girdled	4.461238	0.502789	3.724735	0.376774					
	Crown fire	29.21266	14.95121	2.988461	0.221629					
	Surface fire	18.34141	15.20221	2.749968	0.271790					
Fumaric acid	Control	2.682551	0.622524	1.435427	0.286273	10.5	245.1	C00122	Fumaric acid (2TMS)	1354
	Girdled	2.270970	0.587368	1.614418	0.392013					
	Crown fire	1.844846	0.557668	2.244352	0.321100					
	Surface fire	2.181227	0.660100	1.686425	0.253012					
Oxalic acid	Control	0.482728	0.022198	0.509935	0.021774	10.87	147.1	C00209	Oxalic acid (2TMS)	1381
	Girdled	0.598525	0.051252	0.581292	0.036264					
	Crown fire	0.516006	0.059794	0.468294	0.019256					
	Surface fire	0.442252	0.026560	0.433929	0.032017					
Threonine	Control	2.785324	0.125693	2.311002	0.112517	11.15	218	C00188	Threonine (N,O,O-TMS)	1402
	Girdled	2.878663	0.093354	2.667285	0.200243					
	Crown fire	2.774142	0.162737	2.295197	0.039450					
	Surface fire	2.416455	0.218414	2.212440	0.088149					
β-Alanine	Control	0.059386	0.002582	0.053012	0.002456	11.63	183.1	C00099	β-Alanine, 3TMS	1442
	Girdled	0.056643	0.001035	0.054863	0.004930					
	Crown fire	0.060390	0.004975	0.051848	0.002164					
	Surface fire	0.057028	0.004253	0.048452	0.001783					
Citramalic acid	Control	0.374588	0.031526	7.711949	0.916988	12.24	247.1	C00815	D(-)-Citramalic acid, 3TMS	1491
	Girdled	0.380706	0.037448	11.72614	1.888319					
	Crown fire	0.418408	0.023876	9.078831	1.725876					
	Surface fire	0.412419	0.033689	8.771051	1.716881					
Threitol	Control	1.565780	0.053780	1.636520	0.098003	12.76	103.1	C16884	L-Threitol, tetrakis(trimethylsilyl) ether	1534
	Girdled	1.629689	0.135586	1.791932	0.155969					
	Crown fire	1.282064	0.027188	1.540096	0.062156					
	Surface fire	1.258881	0.078399	1.507282	0.152170					
Aspartic acid	Control	62.75513	2.944389	10.02938	1.034282	12.85	232.2	C00049	L-Aspartic acid, (3TMS)-	1541
	Girdled	80.59078	10.41719	11.68194	1.802287					
	Crown fire	70.35901	11.70768	10.14386	0.825806					
	Surface fire	63.81648	9.40301	9.64505	1.549982					
Pyroglutamic acid	Control	0.342481	0.036727	0.134047	0.006756	12.87	121.6	C01879	Pyroglutamic acid, (N,O-TMS)	1543
	Girdled	0.369288	0.061677	0.167383	0.026932					
	Crown fire	0.360241	0.037515	0.138767	0.010105					
	Surface fire	0.417898	0.015300	0.125422	0.018556					
γ-Aminobutyric acid	Control	6.431955	1.324587	5.782130	0.848301	12.93	174.1	C00334	GABA 3TMS	1548
	Girdled	6.538700	1.022765	5.693284	0.715819					
	Crown fire	8.426904	1.698280	7.068537	0.833687					
	Surface fire	7.210430	1.837485	6.260527	1.396436					
Cysteine	Control	0.321463	0.014976	0.264339	0.021298	13.23	117.1	C00097	L-Cysteine, 3TMS	1572
	Girdled	0.298657	0.041701	0.287634	0.015160					
	Crown fire	0.280693	0.025026	0.303315	0.032592					
	Surface fire	0.300495	0.035654	0.314726	0.012452					
Threonic acid	Control	2.402619	0.276824	1.307204	0.125105	13.38	73.1	C01620	Threonic acid, tris(trimethylsilyl) ether, trimethylsilyl est	1583
	Girdled	2.939555	0.246336	1.629672	0.175521					
	Crown fire	2.984827	0.593831	1.688916	0.166139					
	Surface fire	2.248943	0.216180	1.492065	0.052709					
α-Ketoglutaric acid	Control	0.062685	0.004441	0.061739	0.004975	13.46	156.1	C00026	2-Ketoglutaric acid, 2TMS	1590
	Girdled	0.072127	0.009902	0.070903	0.010151					
	Crown fire	0.053160	0.012315	0.040451	0.003756					
	Surface fire	0.054638	0.011851	0.055305	0.009712					
Arginine	Control	0.065387	0.000696	0.056346	0.002315	13.91	494.3	C00062	Arginine, (3TMS)	1630
	Girdled	0.057184	0.001999	0.057144	0.001383					
	Crown fire	0.064443	0.001438	0.054129	0.002947					
	Surface fire	0.061045	0.002650	0.055206	0.001472					
Glutamic acid	Control	5.031079	0.543199	5.048407	0.367147	13.98	246.2	C00025	Glutamic acid (3TMS)	1637
	Girdled	5.236224	0.673334	5.683895	0.506235					
	Crown fire	4.382050	0.878098	4.501281	0.448313					
	Surface fire	5.487274	0.665480	5.060873	0.608947					
Phenylalanine	Control	0.358288	0.177649	0.162223	0.024594	14.06	218.1	C00079	Phenylalanine (N,O-TMS)	1644
	Girdled	0.326161	0.096316	0.204898	0.023730					
	Crown fire	0.456416	0.155859	0.450351	0.166036					
	Surface fire	0.338140	0.127920	0.209971	0.064562					
Asparagine	Control	0.390191	0.052919	0.168755	0.037757	14.16	188.1	C00152	Asparagine, O,O',N'-tris(trimethylsilyl)-	1653
	Girdled	0.513563	0.151473	0.159156	0.056922					
	Crown fire	0.627536	0.092280	0.175153	0.051530					
	Surface fire	0.543414	0.122107	0.127689	0.030151					
Tartaric acid	Control	0.114422	0.023203	0.343894	0.017013	14.3	188.1	C00898	Tartaric acid, TMS	1666
	Girdled	0.105964	0.016641	0.298738	0.018994					
	Crown fire	0.269351		0.303868	0.039290					
	Surface fire	0.097930	0.02	0.483728	0.189567					

Xylose	Control	50.40489	2.798682	44.65955	4.658236	14.56	307.2	C00181	+)-Xylose, tetrakis(trimethylsilyl) ether, methyloxime (ant	1689
	Girdled	52.94949	3.893338	44.62583	3.510715					
	Crown fire	71.80649	7.811885	40.68807	6.581154					
	Surface fire	57.90267	1.035573	35.51283	2.016271					
Arabinose	Control	142.2467	7.278524	60.85045	6.956826	14.57	103.1	C00216	Arabinose, tetrakis-TMS	1690
	Girdled	142.3202	3.644465	59.23402	5.314491					
	Crown fire	182.0982	23.07803	52.33904	8.160722					
	Surface fire	166.7593	6.07872	42.95568	3.297569					
Ribose	Control	8.847632	0.273803	4.353782	0.296916	14.79	73.1	C00121	d-Ribose, 2,3,4,5-tetrakis-O-(trimethylsilyl)-, O-methyloxime	1710
	Girdled	8.521124	0.207870	4.805905	0.197429					
	Crown fire	10.78582	0.614060	5.074899	0.395344					
	Surface fire	10.59588	0.450228	5.192357	0.155136					
Arabinopyranose	Control	10.84902	1.295801	3.387141	0.262758	15.13	73.1	C00259	DL-Arabinopyranose, 4TMS	1741
	Girdled	12.40288	1.527614	3.703035	0.558179					
	Crown fire	11.50259	2.128657	3.459582	0.132750					
	Surface fire	13.17247	1.856511	2.428931	0.312043					
Arabitol	Control	0.673967	0.061624	0.416330	0.034979	15.14	307.2	C00532	Arabitol (5TMS)	1741
	Girdled	0.743130	0.085825	0.503862	0.061632					
	Crown fire	0.543584	0.077697	0.484868	0.024331					
	Surface fire	0.405468	0.109918	0.388344	0.046707					
Rhamnose	Control	2.557831	0.258102	1.123096	0.042339	15.24	117.1	C00507	D(-)-Rhamnose, tetrakis(trimethylsilyl) ether, methyloxime (anti)	1751
	Girdled	1.485964	0.345341	1.380866	0.054519					
	Crown fire	1.602824	0.378484	1.333126	0.042774					
	Surface fire	1.101917	0.540594	1.454995	0.268740					
Fucose	Control	5.292569	0.043242	4.717381	0.077315	15.33	133.1	C01019	L(-)-Fucose, tetrakis(trimethylsilyl) ether, methyloxime (syn)	1759
	Girdled	5.349474	0.080379	4.741306	0.065173					
	Crown fire	5.314923	0.096204	4.757261	0.112926					
	Surface fire	5.269435	0.099336	4.522105	0.142650					
Tagatofuranose	Control	0.179871	0.018147	0.102800	0.031910	15.6	233.1	C00109	D(-)-Tagatofuranose, pentakis(trimethylsilyl) ether	1781
	Girdled	0.180987	0.024731	0.136400	0.029848					
	Crown fire	0.201369	0.015622	0.138763	0.019348					
	Surface fire	0.173318	0.032593	0.132563	0.016021					
Glutamine	Control	0.159468	0.034423	0.147438	0.025268	15.7	156.1	C00064	L-Glutamine, N,N2-bis(trimethylsilyl)-, trimethylsilyl ester	1791
	Girdled	0.170948	0.031939	0.131881	0.017376					
	Crown fire	0.249381	0.167082	0.107090	0.020026					
	Surface fire	0.208219	0.052575	0.120068	0.022850					
Fucitol	Control	51.84187	4.444363	33.69088	2.430224	15.79	117.1	C00109	L-Fucitol, 5TMS	1800
	Girdled	46.01031	7.322338	31.76853	5.857911					
	Crown fire	55.74075	6.473291	31.28034	2.808581					
	Surface fire	59.11594	6.482482	30.86332	0.694771					
Shikimic acid	Control	0.015585	0.001970	0.859622	0.838716	16	204.1	C00493	Shikimic acid, 4TMS	1821
	Girdled	0.223282		0.984302	0.957325					
	Crown fire	0.068524		1.763148						
	Surface fire	0.267573		2.422976	0.18					
Fructofuranose	Control	567.0259	275.7460	2.936119	1.396369	16.27	217.1	C00109	D(-)-Fructofuranose, pentakis(trimethylsilyl) ether	1848
	Girdled	677.8888	246.0207	1.954682	0.562620					
	Crown fire	663.3880	362.0054	4.614955	1.396418					
	Surface fire	956.2386	395.5601	5.368627	1.583050					
Quinic acid	Control	15.13622	4.980943	11.98803	0.869475	16.78	345.2	C00296	Quinic acid (5TMS)	1899
	Girdled	14.77051	5.379188	8.878646	4.413828					
	Crown fire	17.37832	6.966284	13.04476	0.344604					
	Surface fire	31.42034	7.749166	7.38358	3.774836					
Dulcitol	Control	4.972112	0.745519	5.991926	0.310373	17.63	319.2	C01697	Dulcitol, (6TMS)	1983
	Girdled	5.359271	0.326301	5.785282	0.600718					
	Crown fire	29.00182	22.61265	7.720778	0.951992					
	Surface fire	6.86003	0.33792	8.056279	0.478138					
Gluconic acid	Control	2.006818	0.688947	2.365733	0.116050	18.14	73.1	C00257	Gluconic acid, (6TMS)	2037
	Girdled	2.489342	0.486093	2.390431	0.191035					
	Crown fire	2.559199	0.599031	2.726951	0.113431					
	Surface fire	2.046023	0.661588	2.751070	0.083550					
Palmitic acid	Control	5.274016	0.713848	4.360763	0.907173	18.32	117.1	C00249	Palmitic acid, TMS	2057
	Girdled	4.363040	0.682818	3.546918	1.037045					
	Crown fire	5.547633	1.187611	4.805527	0.556185					
	Surface fire	5.106419	1.412426	5.149855	0.604556					
myo-Inositol	Control	202.0338	41.32483	47.37250	5.431780	19.06	73.1	C00137	myo-Inositol (6TMS)	2137
	Girdled	212.5918	37.60974	47.00529	4.915399					
	Crown fire	191.8452	46.88433	39.54800	5.505183					
	Surface fire	234.8342	47.53618	35.42988	1.725190					
Stearic acid	Control	1.643285	0.213386	1.529055	0.326210	20.05	343.3	C01530	Stearic acid, trimethylsilyl ester	2249
	Girdled	1.366883	0.257069	1.228851	0.347212					
	Crown fire	1.837599	0.448064	1.710122	0.230562					
	Surface fire	1.566350	0.452306	1.931095	0.248938					

Talofuranose	Control	2.795814	0.395373	1.046470	0.222759	22	217.1	D-(+)-Talofuranose, pentakis(trimethylsilyl) ether	2487	
	Girdled	1.214518	0.610755	0.830242	0.143339					
	Crown fire	3.694946	0.692181	0.912129	0.190127					
	Surface fire	3.263539	0.411094	0.874530	0.219306					
Sorbofuranose	Control	2.610586	0.150972	0.300134	0.051033	22.27	217.1	L-(-)-Sorbofuranose, pentakis(trimethylsilyl)	2521	
	Girdled	2.391139	0.204212	0.271072	0.095233					
	Crown fire	2.907105	0.327119	0.257518	0.063738					
	Surface fire	2.552288	0.332027	0.209270	0.048927					
Allofuranose	Control	0.160465	0.070181	0.218629	0.071587	22.4	147.1	D-Allofuranose, pentakis(trimethylsilyl)	2538	
	Girdled	0.151296	0.011719	0.098654	0.015918					
	Crown fire	0.108979	0.013679	0.125221	0.034442					
	Surface fire	0.125426	0.021094	0.147131	0.045669					
Tagatose	Control	2.248121	0.230480	8.746272	0.822886	22.63	73.1	C00795	D-(-)-Tagatose, pentakis(trimethylsilyl)	2565
	Girdled	1.777784	0.147910	10.01489	0.630415					
	Crown fire	2.844177	0.165215	9.177165	0.708874					
	Surface fire	1.870328	0.036551	9.600240	0.638498					
Ribofuranose	Control	3.878091	0.400819	1.913122	0.199866	22.76	73.1	D-(-)-Ribofuranose, tetrakis(trimethylsilyl)	2583	
	Girdled	3.186002	0.251503	2.039227	0.230234					
	Crown fire	4.592242	0.453558	2.084255	0.167402					
	Surface fire	3.809009	0.387000	1.905447	0.224123					
Cellobiose	Control	1.867436	0.166154	1.980627	0.117808	24.21	73.1	C00185	D-(+)-Cellobiose, octakis(trimethylsilyl) ether (isomer 2)	2783
	Girdled	1.705156	0.056505	1.954585	0.058475					
	Crown fire	2.084758	0.161554	1.981434	0.096229					
	Surface fire	1.855387	0.080124	2.053506	0.092139					
Trehalose	Control	0.036578	0.006045	0.190762	0.023536	24.45	361.2	C01083	D-(+)-Trehalose, octakis(trimethylsilyl) ether	2816
	Girdled	0.048191	0.002261	0.243654	0.046282					
	Crown fire	0.050258	0.008797	0.152323	0.027315					
	Surface fire	0.066618	0.005903	0.118595	0.036532					
Turanose	Control	0.607658	0.081087	1.465417	0.074260	24.6	217.1	C19636	D(+)-Turanose, TMS	2838
	Girdled	0.553332	0.026546	1.517695	0.133834					
	Crown fire	0.555881	0.044801	1.649787	0.141177					
	Surface fire	0.614179	0.059139	1.514659	0.140770					
Maltose	Control	0.100228	0.013308	0.199145	0.038591	24.66	361.2	C00208	Maltose, TMS	2846
	Girdled	0.084460	0.020901	0.085974	0.027449					
	Crown fire	0.126776	0.026543	0.109976	0.035436					
	Surface fire	0.088473	0.039687	0.164111	0.065026					
3 α -Mannobiose	Control	0.104358	0.007418	0.064768	0.004050	24.97	217.1	C00208	3- α -Mannobiose, octakis(trimethylsilyl) ether (isomer 2)	2890
	Girdled	0.111301	0.011320	0.062512	0.011496					
	Crown fire	0.087879	0.022934	0.110649	0.005903					
	Surface fire	0.067749	0.011502	0.077949	0.003869					
Catechin	Control	1.880863	0.199662	5.621223	0.531263	25.04	73.1	C06562	Catechine, penta-TMS-ether, (2R-cis)-	2900
	Girdled	1.832902	0.080908	5.545953	0.458364					
	Crown fire	2.433844	0.239067	4.570497	0.376230					
	Surface fire	2.426421	0.218596	5.208667	0.438565					
Epicatechin	Control	0.064401	0.008464	0.105569	0.014271	25.2	368.2	C09727	Catechine, penta-TMS-ether, (2R-cis)-	2922
	Girdled	0.056979	0.005426	0.109339	0.012744					
	Crown fire	0.089258	0.022135	0.093817	0.023398					
	Surface fire	0.086950	0.009877	0.123966	0.026554					
Melibiose	Control	0.010378	0.002463	0.035189	0.009916	25.21	370.2	C05402	Melibiose, octakis(trimethylsilyl)-	2924
	Girdled	0.009645	0.002930	0.029520	0.000887					
	Crown fire	0.021342	0.005981	0.026263	0.002501					
	Surface fire	0.017132	0.004673	0.026798	0.006744					
Galactinol	Control	0.126550	0.024699	0.171565	0.044397	26.35	204.1	C01235	Galactinol, nonakis(trimethylsilyl) ether	3041
	Girdled	0.091049	0.020290	0.136785	0.044601					
	Crown fire	0.261870	0.043515	0.396567	0.088904					
	Surface fire	0.251673	0.039583	0.398081	0.103769					
Chlorogenic acid	Control	0.359233	0.013089	0.041827	0.008254	27.27	73.1	C00852	Chlorogenic acid (6TMS)	3105
	Girdled	0.352237	0.006563	0.037392	0.011729					
	Crown fire	0.488540	0.015490	0.033216	0.008208					
	Surface fire	0.465823	0.029440	0.023969	0.007848					
Internal standard:										
Adonitol (Ribitol)						15.3	147; 217; 103	C00474	Ribitol, 5TMS	1756

Online Resource 3:



Effects of control, trunk girdling, simulated crown fire and simulated surface fire treatments on average weight per apple in the middle section of the canopy at harvest the subsequent growing season following the treatment period (mean \pm SE; n = 4)