

Supplementary Material

Molecular composition and the impact of fuel moisture content on fresh primary organic aerosol emissions during laboratory combustion of ponderosa pine needles

Mohammed Jaoui^{A,}, Shawn P. Urbanski^B, Russell W. Long^A and Matthew S. Landis^A*

^AUS Environmental Protection Agency (EPA), Office of Research and Development, Research Triangle Park, NC, USA

^BUS Department of Agriculture (USDA), Forest Service, Rocky Mountain Research Station, Missoula, MT, USA

*Correspondence to: Email: jaoui.mohammed@epa.gov

Table S1. Wildland fuel types and conditions associated with the 33 burn experiments conducted at the US Forest Service's Fire Sciences Laboratory (FSL) in Missoula, Montana, 16–24 April 2018.

Burn	Date of exp. (dd-mm-yyyy)	T (°C)	RH (%)	PPN dry (g)	PPN moist (g)	FWD dry (g)	FWD moist (g)	PM_{2.5} (µg m⁻³)
1	16-Apr-2018	26.2 ± 0.3	27.6 ± 0.3	110	0	118	0	148.3 ± 39.4
2	16-Apr-2018	26.6 ± 0.3	27.0 ± 0.4	280	0	117	0	427.0 ± 96.6
3	16-Apr-2018	25.7 ± 0.6	26.2 ± 0.9	50	0	26	0	47.6 ± 12.5
4	16-Apr-2018	26.4 ± 0.4	23.7 ± 0.7	20	0	0	0	140.9 ± 40.3
5	17-Apr-2018	25.9 ± 0.2	19.6 ± 0.2	29	0	21	0	28.7 ± 7.4
6	17-Apr-2018	26.2 ± 0.3	19.4 ± 0.3	90	0	90	0	79.0 ± 21.3
7	17-Apr-2018	26.9 ± 0.2	18.2 ± 0.2	507	0	212	0	555.6 ± 102.3
8	17-Apr-2018	26.3 ± 0.5	17.2 ± 0.3	11	0	162	0	75.9 ± 20.0
9	17-Apr-2018	26.9 ± 0.4	16.7 ± 0.3	779	0	0	0	1814.9 ± 265.3
10	18-Apr-2018	23.7 ± 0.5	19.2 ± 0.4	10	0	300	0	104.3 ± 26.9
11	18-Apr-2018	24.7 ± 0.4	19.4 ± 0.4	20	0	544	0	191.0 ± 47.7
12	18-Apr-2018	26.1 ± 0.2	18.5 ± 0.1	34	0	1001	0	352.6 ± 86.4
13	18-Apr-2018	26.5 ± 0.4	17.7 ± 0.3	560	0	230	0	563.0 ± 117.2
14	19-Apr-2018	26.1 ± 0.3	17.3 ± 0.4	63	0	1780	0	715.6 ± 137.5
15	19-Apr-2018	26.3 ± 0.6	18.3 ± 0.6	100	0	2230	0	922.9 ± 130.7
16	19-Apr-2018	26.6 ± 0.5	17.5 ± 0.4	10	0	154	0	83.7 ± 22.5
17	19-Apr-2018	26.5 ± 0.5	18.8 ± 0.5	700	0	300	0	671.7 ± 109.4
18	20-Apr-2018	22.7 ± 0.5	20.8 ± 0.5	22	20	0	0	45.8 ± 11.7
19	20-Apr-2018	22.5 ± 0.5	22.0 ± 0.6	40	40	0	0	233.5 ± 48.0
20	20-Apr-2018	23.8 ± 0.4	21.3 ± 0.4	60	80	0	0	1587.0 ± 223.6
21	20-Apr-2018	24.2 ± 0.7	20.7 ± 0.9	50	42	0	0	1119.9 ± 228.9
22	21-Apr-2018	22.6 ± 0.3	23.1 ± 0.4	15	16	0	0	35.6 ± 11.8
23	21-Apr-2018	25.3 ± 0.7	21.2 ± 0.8	47	29	0	0	254.3 ± 59.4
24	21-Apr-2018	25.4 ± 0.6	21.4 ± 0.7	28	44	0	0	342.0 ± 84.6
25	21-Apr-2018	25.3 ± 0.5	20.4 ± 0.6	40	34	0	38	156.2 ± 45.6
26	21-Apr-2018	25.9 ± 0.3	18.6 ± 0.3	84	135	0	0	577.4 ± 155.5
27	23-Apr-2018	23.5 ± 0.8	18.6 ± 0.7	0	132	0	0	136.6 ± 35.6
28	23-Apr-2018	25.5 ± 0.4	17.8 ± 0.3	0	308	0	0	541.9 ± 133.4

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29	23-Apr-2018	26.3 ± 0.5	15.8 ± 0.2	0	171	0	118	230.1 ± 68.5
30	23-Apr-2018	26.7 ± 0.4	15.9 ± 0.4	43	218	0	0	452.5 ± 126.2
31	24-Apr-2018	25.5 ± 0.6	17.4 ± 0.4	0	214	0	0	378.8 ± 96.3
32	24-Apr-2018	26.4 ± 0.5	18.5 ± 0.7	0	355	0	0	644.5 ± 124.8
33	24-Apr-2018	26.3 ± 0.7	17.3 ± 0.6	0	90	0	0	236.6 ± 57.0

Fuel codes and descriptions are: PPN dry, dry ponderosa pine needles. Moisture content ~5% of dry weight; PPN moist, moist ponderosa pine needles, with a moisture content ~10–60% of dry weight; FWD dry, dry ponderosa pine fine woody debris, with a moisture content ~5% of dry weight; FWD moist, moist ponderosa pine fine woody debris, with a moisture content ~ 20% of dry weight. Fuel masses for the categories, PPN dry, PPN moist, FWD dry and FWD moist, are pre-fire oven-dry weight. Fuel consumption ranged from 20 to ~100%. Pine cones were added to the mixture for Burn 30.

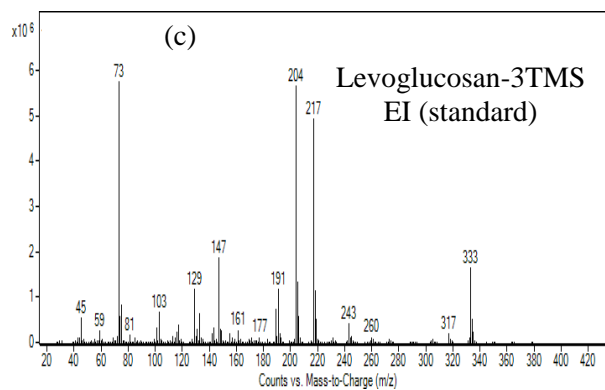
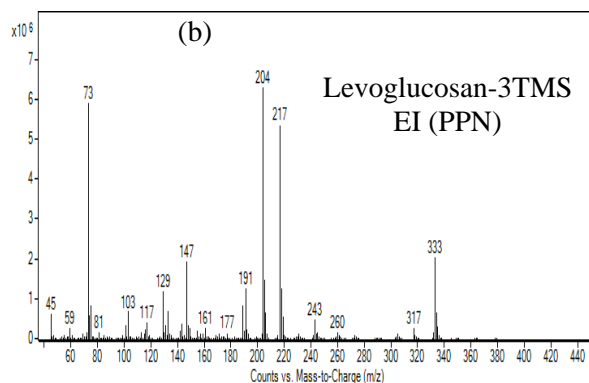
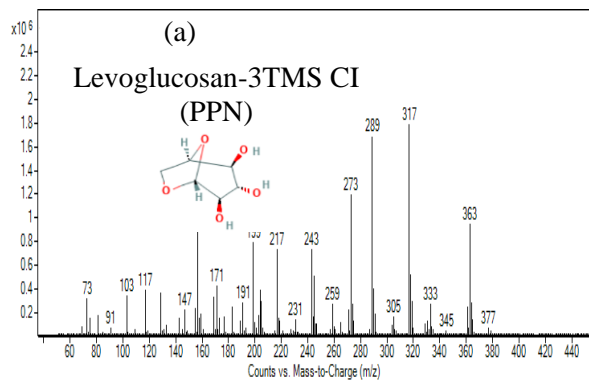
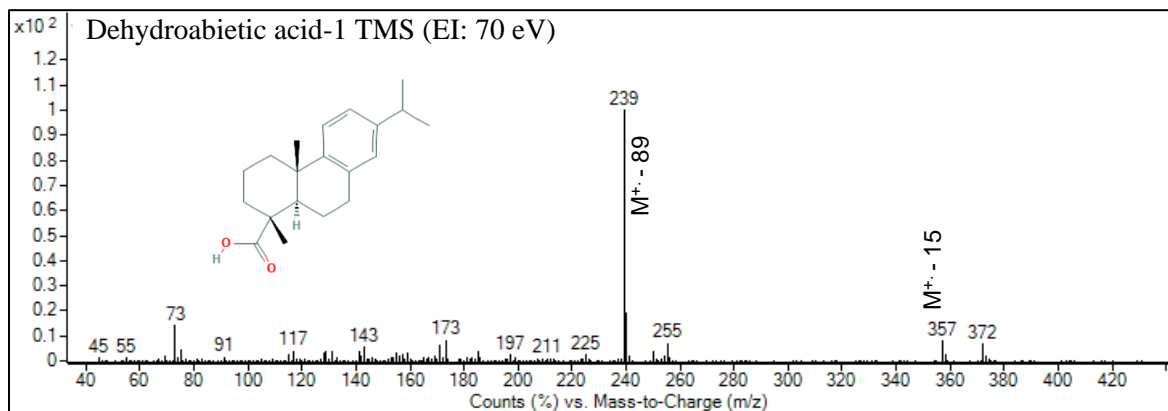
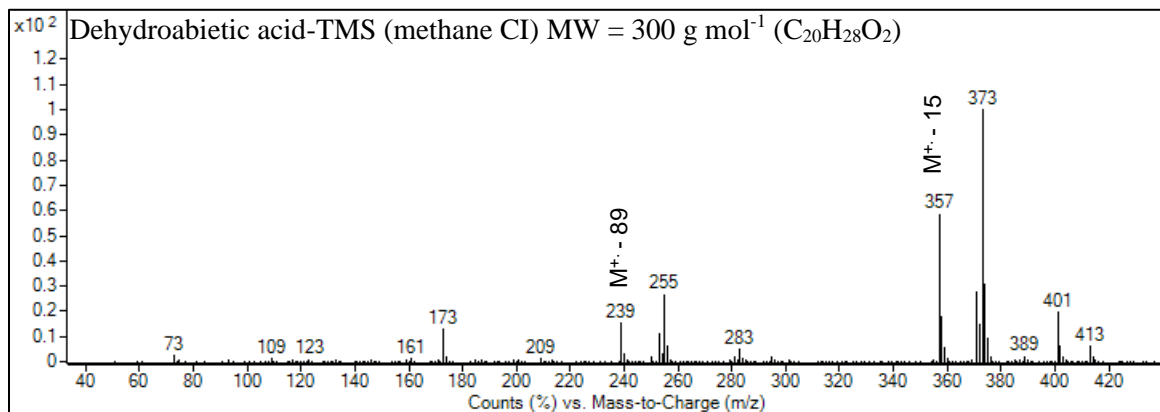
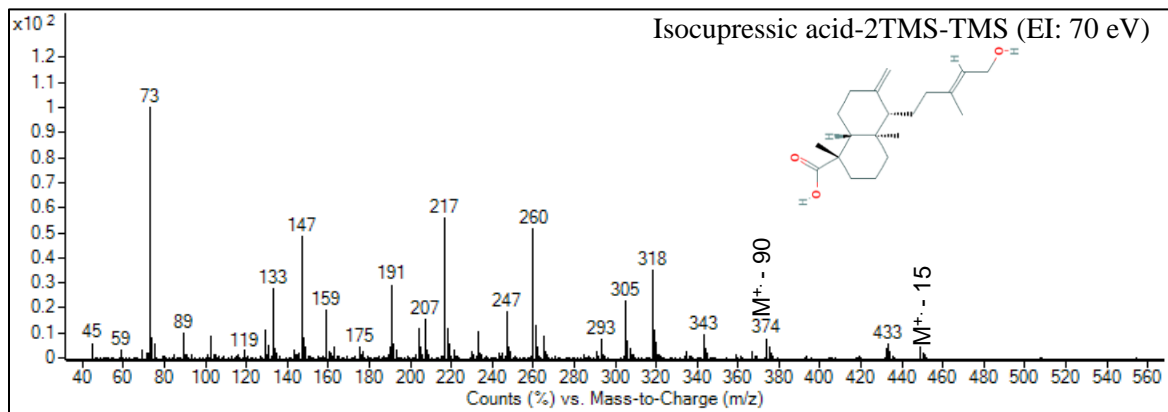
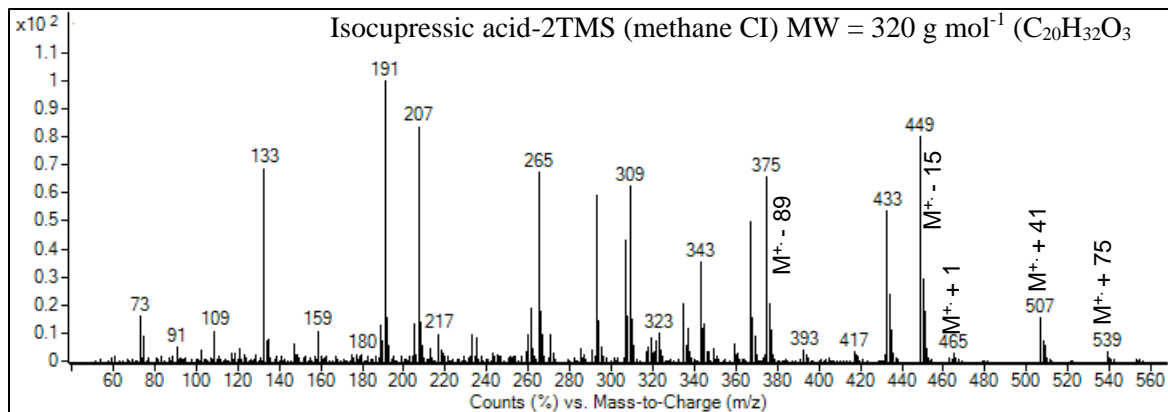


Fig. S1. Mass spectra of TMS derivatives recorded in methane-CI and EI (70 eV) of Levoglucozan observed in smoke particles (PM_{2.5}) collected during pine needle combustion.



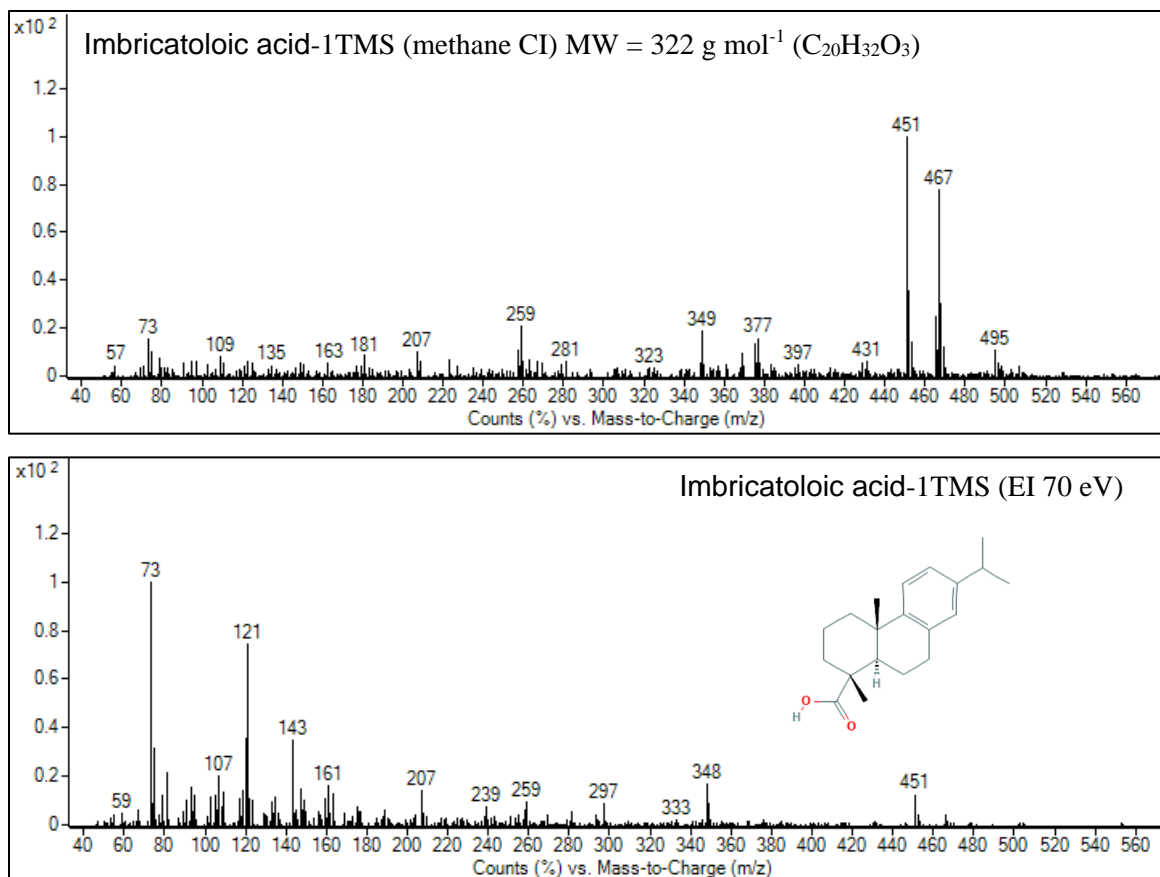


Fig. S2. Mass spectra of TMS derivatives recorded in methane-CI and EI (70 eV) of isocupressic acid, dehydroabietic acid, and imbricatoloic acid observed in smoke particles (PM_{2.5}) collected during PPN combustion.