Supplementary material

Cell wall - mediated response to UV radiation in needles of *Picea omorika*

Aleksandra Mitrović, Jasna Simonović Radosavljević, Miloš Prokopijević, Dragica Spasojević, Jovana Kovačević, Olivera Prodanović, Bratislav Todorović, Branko Matović, Mira Stanković, Vuk Maksimović, Dragosav Mutavdžić, Miloš Skočić, Mirjana Pešić, Ljiljana Prokić, Ksenija Radotić

Supplementary Table 1. Relative band intensities of FTIR spectra shown in Fig. 4, calculated with respect to the 1650 cm^{-1} or 1611 cm^{-1} band, for the samples of isolated CWs, or for corresponding samples after NaOH hydrolysis, respectively. Ct, UVBt, UVCt, Cr, UVBr, UVCr – the samples of *P. omorika* needles isolated CWs of control, UV-B and UV-C treated plants, and after one month recovery, respectively.

	Relative band intensity	Ct	UVBt	UVCt	Cr	UVBr	UVCr
Isolated Cell walls	1650/872	2.11	1.34	1.57	1.96	1.61	1.59
	1650/899	2.08	1.34	1.52	1.84	1.57	1.55
	1650/1064	1.01	1.01	1.01	0.97	1.01	0.99
	1650/1160	1.20	1.07	1.10	1.15	1.13	1.11
	1650/1250	1.25	1.09	1.13	1.19	1.17	1.15
	1650/1320	1.26	1.10	1.14	1.22	1.18	1.16
	1650/1375	1.26	1.11	1.14	1.24	1.19	1.16
	1650/1440	1.21	1.11	1.14	1.23	1.19	1.17
	1650/1460	1.21	1.11	1.15	1.22	1.19	1.18
	1650/1516	1.23	1.14	1.16	1.22	1.18	1.19
	1650/1650	1	1	1	1	1	1
	1650/1735	1.24	1.07	1.11	1.24	1.17	1.16
	1650/3435	1.19	1.27	1.16	1.09	1.27	1.09
Isolated Cell walls after NaOH hydrolysis	1611/872	1.87	1.44	1.33	1.91	1.47	1.40
	1611/899	1.84	1.42	1.33	1.86	1.45	1.38
	1611/1064	1.02	1.18	1.03	0.95	1.02	0.98
	1611/1160	1.16	1.45	1.14	1.02	1.10	1.09
	1611/1264	1.32	1.89	1.29	1.10	1.21	1.19
	1611/1320	1.18	1.39	1.20	1.15	1.14	1.09
	1611/1375	1.16	1.50	1.18	1.17	1.13	1.11
	1611/1422	1.14	1.50	1.16	1.18	1.13	1.10
	1611/1460	1.19	1.64	1.19	1.26	1.12	1.13
	1611/1510	1.26	2.16	1.22	1.37	1.24	1.18
	1611/1611	1	1	1	1	1	1
	1611/1735	1.33	2.16	1.21	1.54	1.25	1.23
	1611/3422	1.10	1.80	0.96	1.06	1.21	1.14

Supplementary Table 2. POD and PO activity (soluble, ionic- and covalently- bound), lignin and total phenolic content (free and CW-bound) content in the needles of treated and control P. omorika trees. a/A, b/B - significant difference at $p<0.05$; mean values marked with different letters are significantly different; capital letters indicate differences between the treatments, and small letters indicate differences between the samples after radiation and after one month recovery; Ct, UVBt, UVCt, Cr, UVBr, UVCr – the samples of control, UV-B and UV-C treated plants, and after one month recovery, respectively

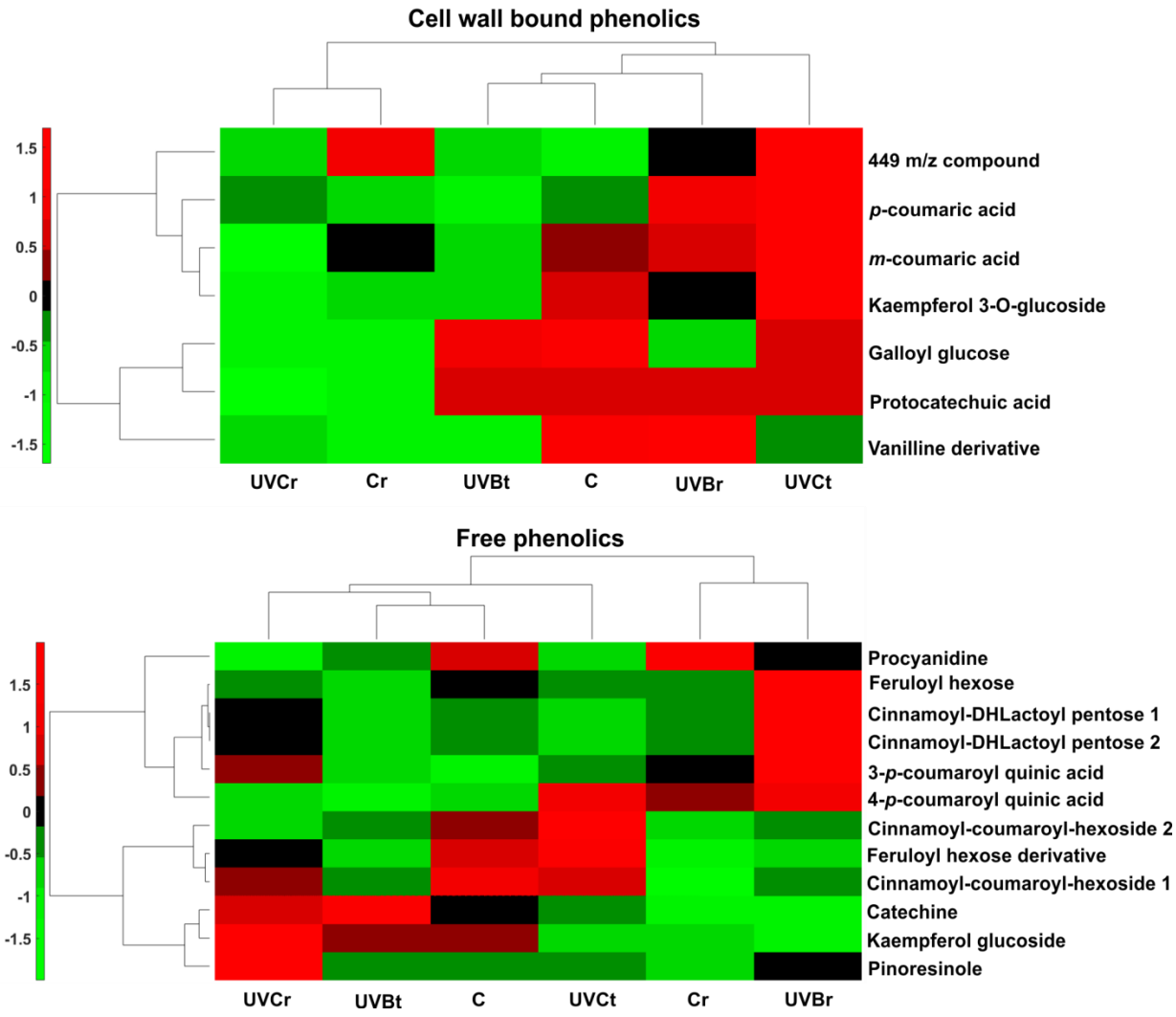
		Ct	UVBt	UVCt	Cr	UVBr	UVCr
Lignin content (µmol CA eq g^{-1}FW)		54.97±5.89 Ba	34.98±2.16 Aa	39.55±3.64 Aa	41.98±1.98 ABb	39.24±1.22 Aa	52.9±4.22 Bb
Total soluble phenols (µmol GA eq g^{-1}FW)		92.39±4.95 Aa	72.74±7.61 Ba	69.94±3.12 Ba	68.71±4 Ab	67.17±7.54 Aa	74.69±4.14 Aa
Total CW-bound phenols (µmol GA eq g^{-1}FW)		29.12±0.43 Aa	31.75±2.54 ABa	36.11±0.75 Bb	30.8±2.31 Aa	31.95±1.85 Aa	27.72±0.37 Aa
Peroxidase ($U\ g^{-1}$ FW)	soluble	5.22±0.63 Aa	3.89±0.98 Aa	6.56±1.97 Aa	5.81±1.21 Aa	7.56±0.78 Aa	6.86±0.63 Aa
	covalent	0.05±0.02 Aa	0.05±0.02 Aa	0.05±0.01 Aa	0.02±0.01 Aa	0.42±0.14 Bb	0.17±0.07 Aa
	ionic	0.26±0.09 Aa	0.27±0.02 Aa	1.14±0.19 Aa	1.47±0.24 Ab	0.98±0.57 Aa	3.58±0.7 Bb
Polyphenol oxidase ($U\ g^{-1}$ FW)	soluble	52338.95±3847.31 Aa	33733.79±2375.65 Ba	53769.75±6067.22 Aa	51094.72±5700.01 Aa	53796.32±5215.63 Ab	45639.36±1633.62 Aa
	covalent	48.92±6.01 Aa	47.72±6.06 Aa	37.84±3.28 Aa	36.43±8.62 Aa	90.9±25.91 Bb	69.64±4.76 ABa
	ionic	84.65±17.65 Aa	101.88±15.32 Aa	98.42±6.06 Aa	108.55±8.87 Aa	159.06±22.58 Ab	126.46±20.99 Ab

Supplementary Table 3. Fluorescence emission ratios BF/FRF (F445/F735) and RF/FRF (F687/F735) for the UV-B and UV-C treatments. Ct, UVBt, UVCt, Cr, UVBr, UVCr denote: control samples for radiation treatments, UV-B radiation treated samples, UV-C radiation treated samples, control for one month recovery, UV-B radiation treated samples after recovery, UV-C radiation treated samples after the recovery

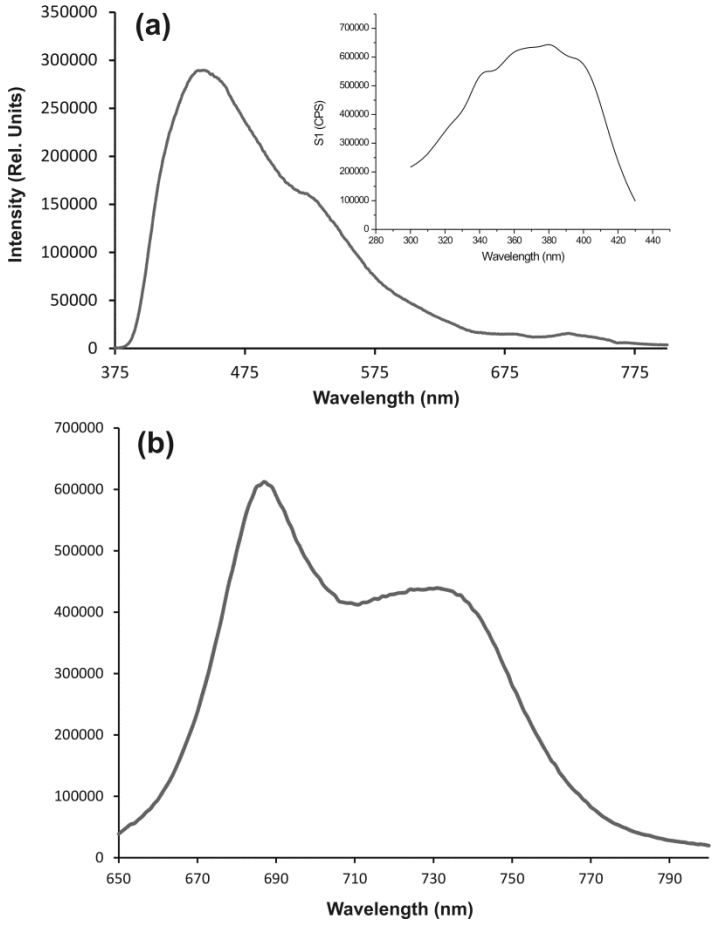
Ratio of the maxima	**Ct**	**UVBt**	**UVCt**	**Cr**	**UVBr**	**UVCr**
F445/F735	20.42±0.57[a]	29.73±1.39[b]	25.76±1.76[ab]	22.74±0.82	24.24±2.55	19.02±3.01
F687/F735	1.27±0.07	1.390±0.07	1.41±0.03	1.35±0.08	1.27±0.01	1.28±0.06

a, b significant difference at $p<0.05$; mean values marked with different letters are significantly different

The differences were tested among the UV-B, UV-C treatments and control, immediately after radiation and one month later, and for each ratio; marked are only the cases which were statistically different.



Supplementary Figure 1. Clustergram of individual cell wall-bound- and free phenolics in the needles of one-year old *P. omorika*, and the UV-C or UV-B treatments. Ct, UVBt, UVCt, Cr, UVBr, UVCr – the samples of control, UV-B and UV-C treated plants, and after one month recovery, respectively. Red and green color present values above and below the average level of individual phenolics; color code on the left side denotes levels of the standardized concentration values.



Supplementary Figure 2. *In vivo* measured BF (A) and FRF (B) emission spectra after 375 nm excitation, for the needles of a control tree. The inset in B: the excitation spectrum for the BGF emission.