

Annex A. Physico-chemical characteristics of biochar

Table 1.1. Physico-chemical characteristics of the biochar from various feedstock

Characteristics Type of biochar	Yield, %	Bulk density, g/cm ³	Apparent density, g/cm ³	TOC, %	WHC, %	Total porosity, %	Pore surface area, m ² /g	Pore volume, cm ³ /g
P450	25.0	1.4	0.5	88.8	11.8	81.3	8.6	1.5
F450	23.9	n.a.	n.a.	88.4	13.2	n.a.	n.a.	n.a.
A450	19.6	1.7	0.6	85.4	16.5	79.2	5.6	1.1
B450	20.1	n.a.	n.a.	87.9	13.5	n.a.	n.a.	n.a.

TOC – total organic carbon, WHC – water holding capacity.

Table 1.2. COHN content of modified and unmodified biochar ± SD

BC	Modification conditions	Particle size, mm	C, %	H, %	N, %	O, %
P450	-	0.4-1	82.84±0.02	9.12±0.02	0.012±0.00	6.17±0.023
F450	-	0.4-1	82.49±0.01	9.27±0.00	0.14±0.00	8.11±0.004
A450	-	0.4-1	78.50±0.01	11.32±0.01	0.005±0.00	10.11±0.052
B450	-	0.4-1	82.96±0.00	9.03±0.00	0.027±0.00	8.00±0.001
P450	MgCl ₂	0.4-1	71.81±0.03	18.54±0.04	0.09±0.00	6.43±0.000
F450	MgCl ₂	0.4-1	77.16±0.05	14.07±0.05	0.108±0.00	8.72±0.001
A450	MgCl ₂	0.4-1	69.05±0.06	12.03±0.07	0.12±0.00	9.73±0.002
B450	MgCl ₂	0.4-1	68.36±0.06	21.56±0.03	0.017±0.00	7.48±0.003
P450	FeCl ₃	0.4-1	79.62±0.06	16.10±0.06	0.026±0.00	8.33±0.003
F450-	FeCl ₃	0.4-1	78.76±0.05	12.01±0.05	0.038±0.00	9.19±0.003
A450	FeCl ₃	0.4-1	76.56±0.06	12.43±0.06	0.167±0.00	11.01±0.023
B450	FeCl ₃	0.4-1	72.88±0.02	19.73±0.02	0.2±0.00	7.21±0.015

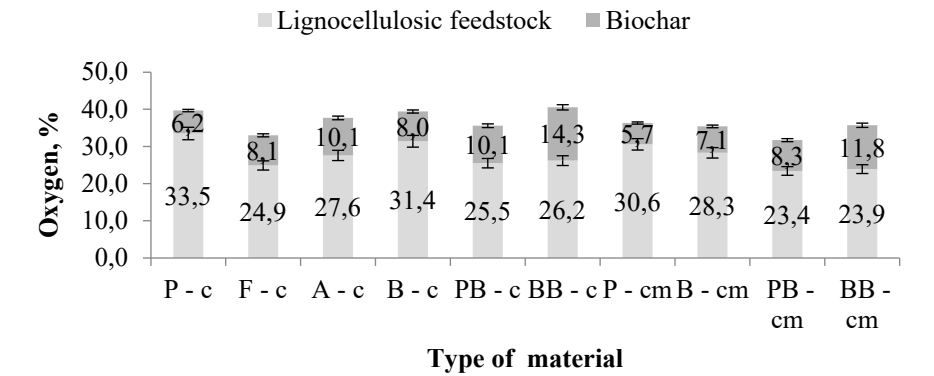


Fig 1.1. Oxygen content in the lignocellulosic feedstock and biochar (n=3, mean value ± SD)

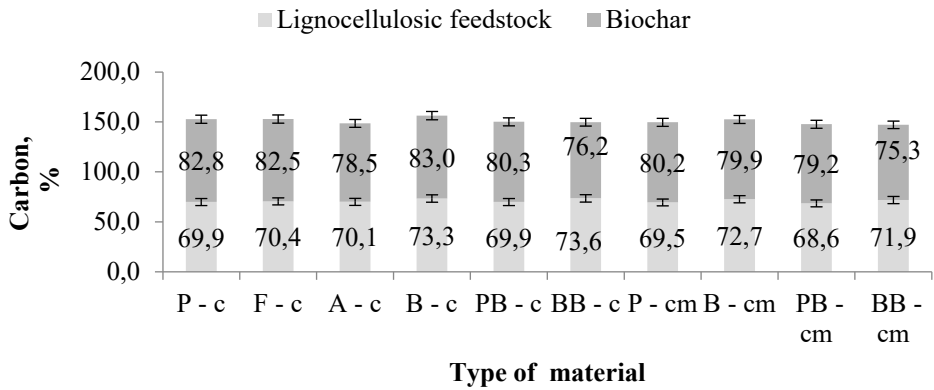


Fig 1.2. Carbon content in the lignocellulosic feedstock and biochar (n=3, mean value ± SD)

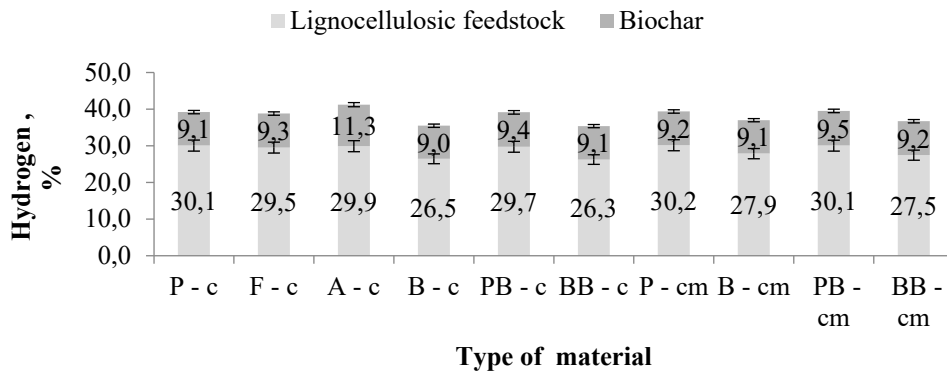


Fig 1.3. Hydrogen content in the lignocellulosic feedstock and biochar (n=3, mean value ± SD)

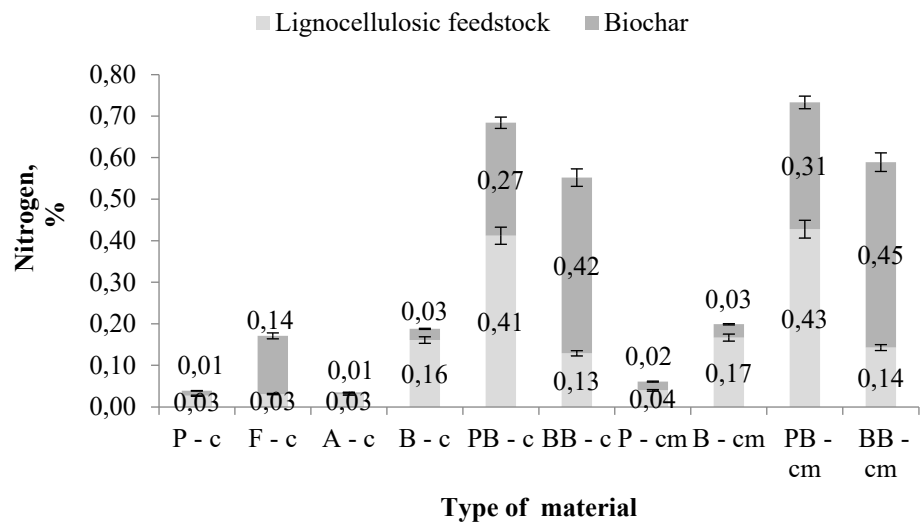


Fig 1.4. Nitrogen content in the lignocellulosic feedstock and biochar (n=3, mean value ± SD)

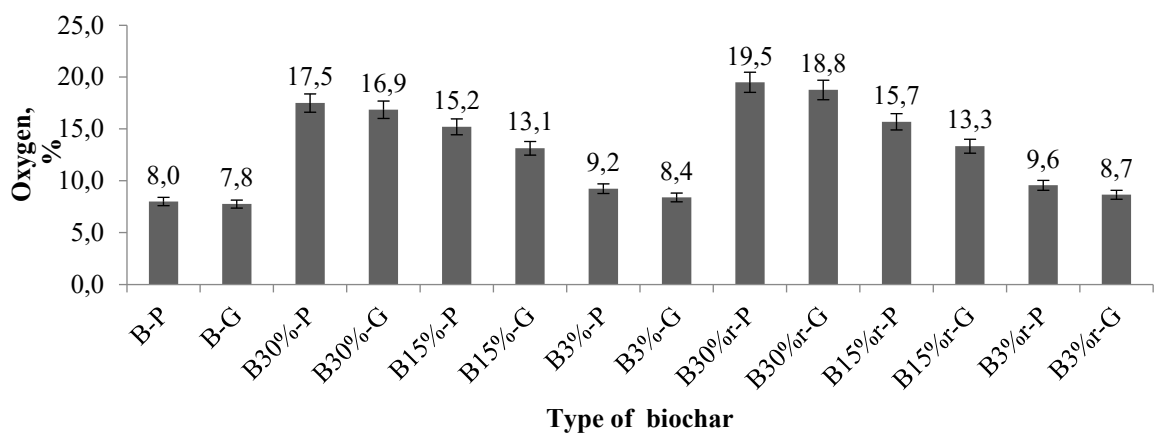


Fig 1.5. Oxygen content in the unmodified and H₂O₂-modified biochar (n=3, mean value ± SD)

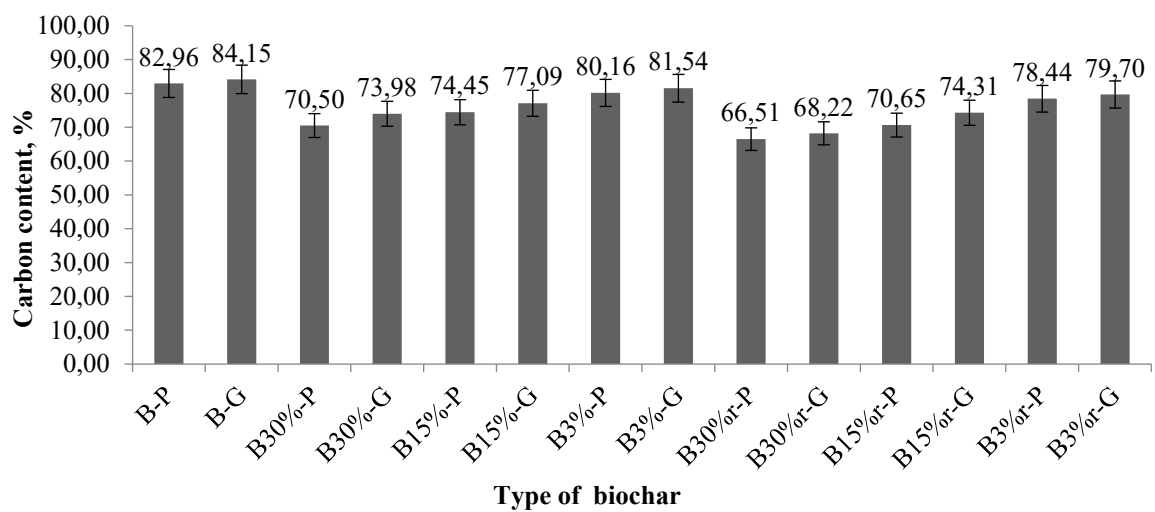


Fig 1.6. Carbon content in the unmodified and H₂O₂-modified biochar (n=3, mean value ± SD)

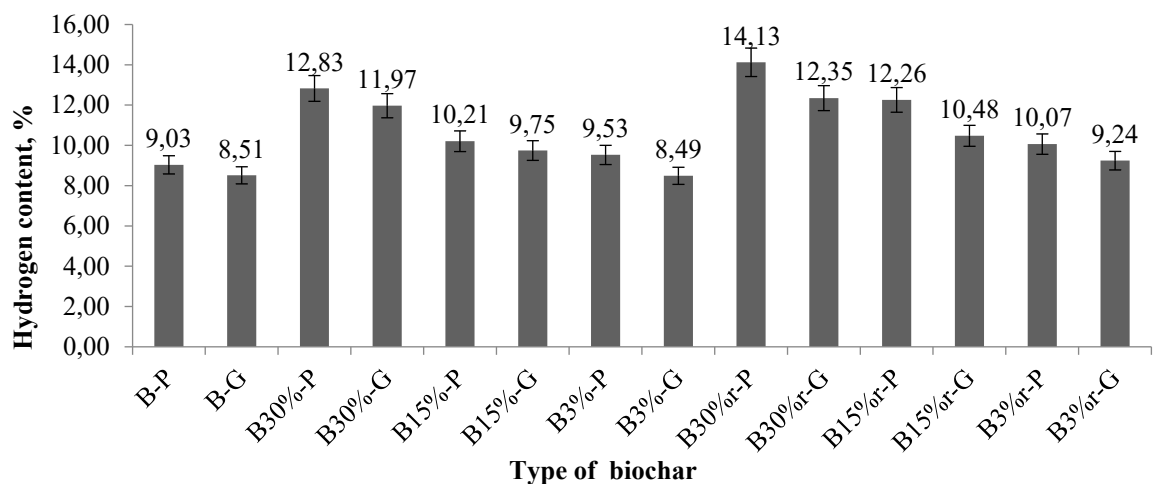


Fig 1.7. Hydrogen content in the unmodified and H₂O₂-modified biochar (n=3, mean value ± SD)

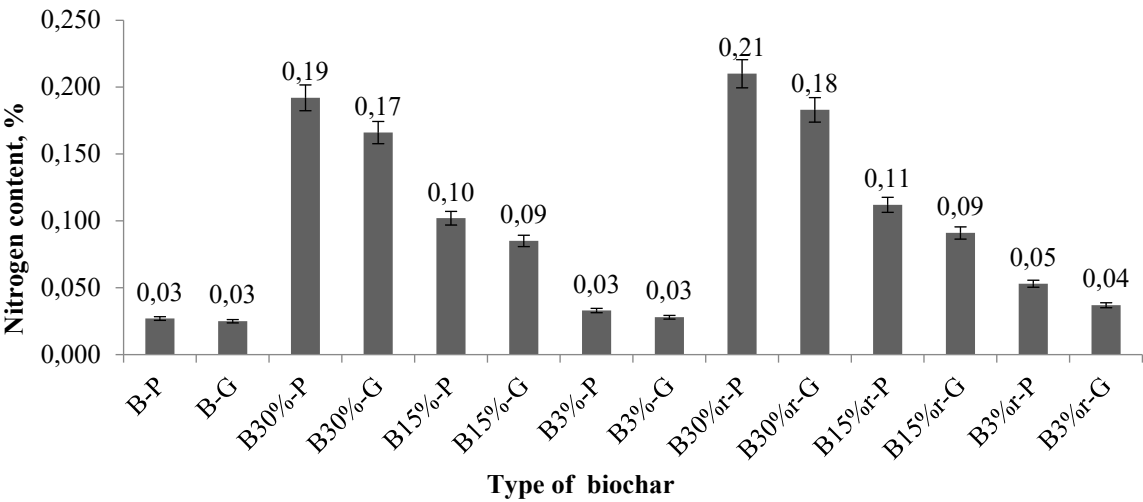


Fig 1.8. Nitrogen content in the unmodified and H₂O₂-modified biochar (n=3, mean value ± SD)

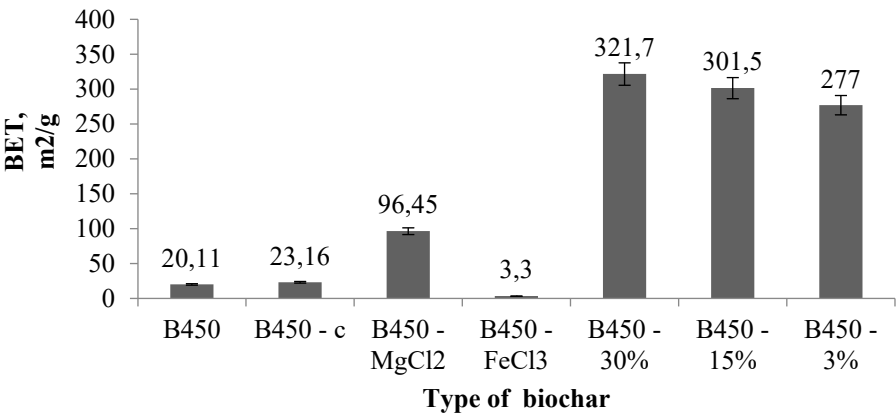


Fig 1.9. Effect of modifications on BET specific surface area of the birch biochar (comparison data)

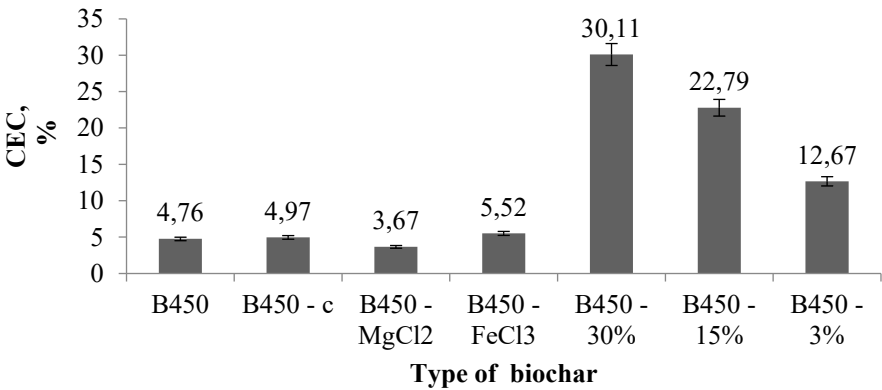


Fig 1.10. Effect of modifications on cation exchange capacity of the birch biochar (comparison data)

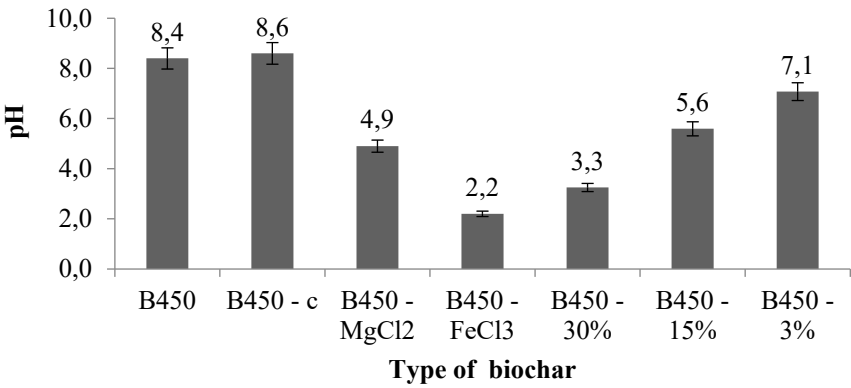


Fig 1.11. Effect of modifications on pH of the birch biochar (comparison data)

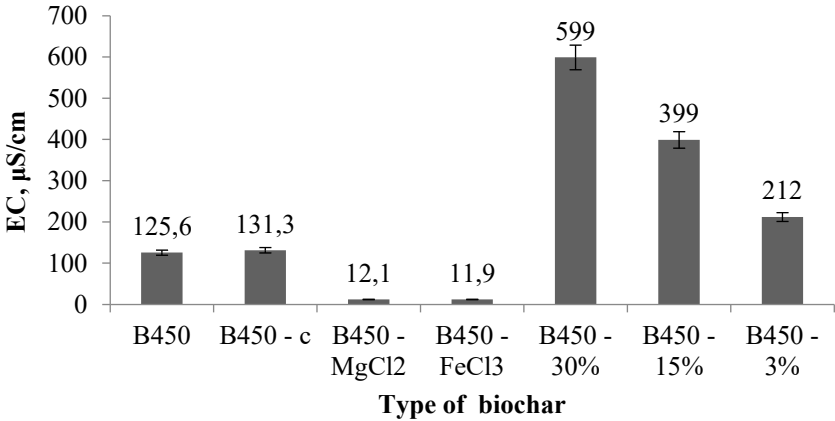


Fig 1.12. Effect of modifications on electrical conductivity of the birch biochar (comparison data)

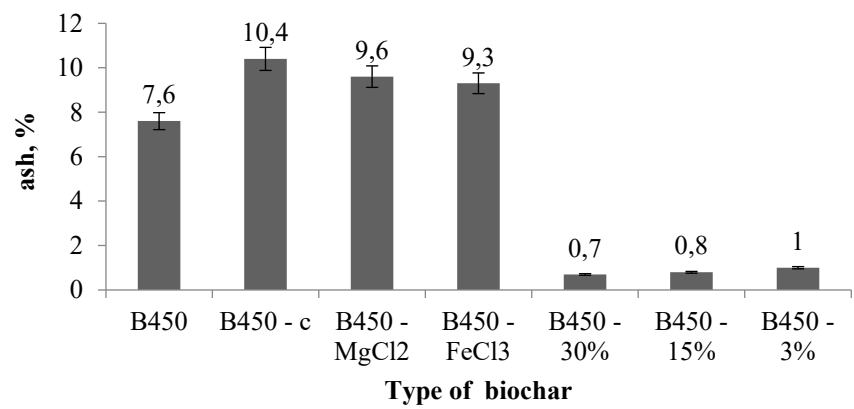


Fig 1.13. Effect of modifications on ash of the birch biochar (comparison data)

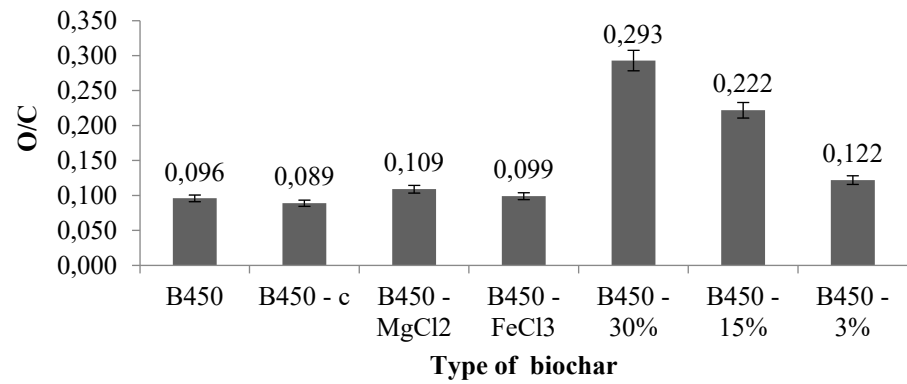


Fig 1.14. Effect of modifications on O/C ratio of the birch biochar (comparison data)

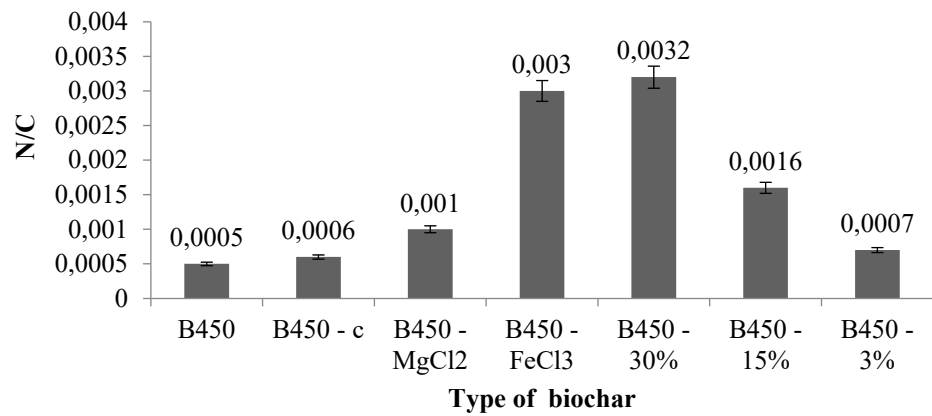


Fig 1.15. Effect of modifications on N/C ratio of the birch biochar (comparison data)