

Laser Diffraction as an Innovative Alternative to Standard Pipette Method for Determination of Soil Texture Classes in Central Europe

SUPPLEMENTARY MATERIAL

Table S1. Different classification systems of particle size fractions mentioned in this study.

Particle diameter (μm)	USDA	FAO/WRB [43]	Kachinski [45]	CSS*	
<0.1	Clay	Clay	Colloidal clay	Clay	
0.1–0.5			Fine clay		
0.5–1			Coarse clay		
1–2	Silt	Fine silt	Fine silt	Medium and fine silt	
2–5			Medium silt		
5–10			Coarse silt	Coarse silt	Coarse silt
10–20					
20–50		Very fine sand	Coarse silt	Fine sand	Medium and fine sand
50–63					
63–100	Fine sand	Very fine sand			
100–125					
125–200					
200–250	Medium sand	Fine sand			
250–500					
500–630					
630–1000	Coarse sand	Coarse sand	Medium sand	Coarse sand	
1000–1250					
1250–2000	Very coarse sand	Coarse sand			Gravel

Note: * CSS – complex soil survey in Slovakia



Sampling soil depth 15–20 cm



Sampling soil depth 40–45 cm

Figure S1. Taking disturbed samples in the arable land during the field campaign (Source: Igaz).



Figure S2. Agricultural land in the Nitra River basin (Source: Aydin).



Figure S3. Agricultural land in the Váh River basin (Source: Aydin).



Figure S4. Agricultural land in the Hron River basin (Source: Igaz).



Figure S5. Particle size laser analyzer Analysette22 MicroTec plus (Fritsch, Germany) (from left to right: dry dispersion unit, measuring unit, wet dispersion unit) (Source: Aydin).



Figure S6. Particle size laser analyser Mastersizer 2000 (Malvern, UK) (from left to right: dry dispersion unit Scirocco 2000, measuring unit, wet dispersion unit Hydro MU) (Source: Tall).

Table S2. Percentage distribution of soil texture classes in the Nitra, Váh and Hron River basins, Slovakia according to Novák's classification.

Soil texture class	Nitra (%)	Váh (%)	Hron (%)	All (%)
Sandy soil	1.1	0.0	0.0	0.4
Loam-sandy soil	4.2	6.8	17.6	9.4
Sand-loamy soil	20.0	34.7	34.7	29.5
Loamy soil	63.2	43.2	23.3	43.7
Clay-loamy soil	10.5	9.1	20.5	13.3
Clay soil	1.1	5.1	2.8	3.0
Clay	0.0	1.1	1.1	0.7
	100	100	100	100

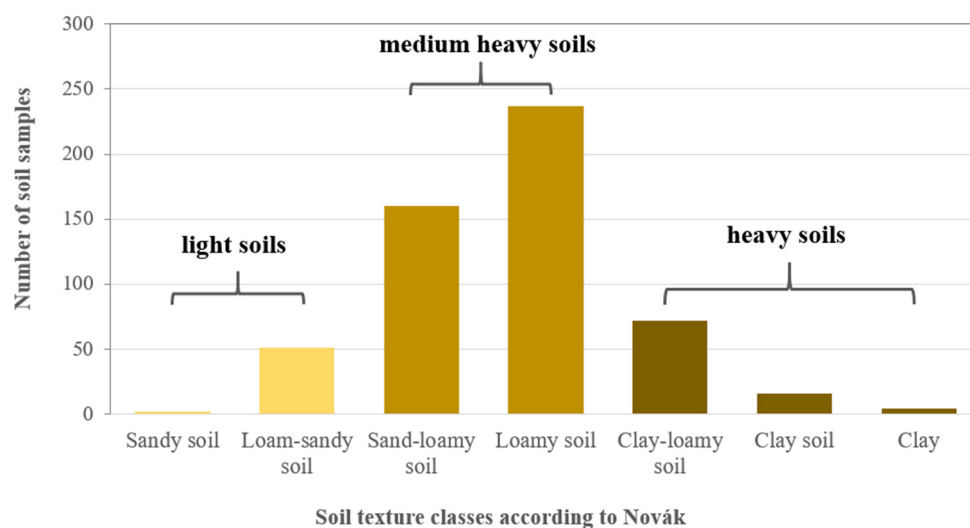
**Figure S7.** Representation of the soil texture classes in the whole study area (n = 542).

Table S3. Results on statistical analysis of cumulative percentage distribution of particle size fractions determined by pipette method.

<0.001 mm	Nitra	Váh	Hron	All
Mean	18.46284211	16.84494318	17.11965909	17.50130996
Standard Error	0.491151168	0.540311412	1.123527223	0.440165796
Median	18.540	16.445	10.625	16.445
Mode	20.02	20.14	14.62	7.68
SD	6.770051646	7.168040896	14.90527297	10.24745299
Sample Variance	45.83359929	51.38081028	222.1671622	105.0102927
Kurtosis	-0.120470317	1.071622529	0.520409662	2.383160294
Skewness	0.090999432	0.688431846	1.071689181	1.079311368
Range	34.55	42.24	76.48	76.48
Minimum	2.38	1.67	0.83	0.83
Maximum	36.93	43.91	77.31	77.31
Sum	3507.94	2964.71	3013.06	9485.71
Count	190	176	176	542
<0.01 mm	Nitra	Váh	Hron	All
Mean	35.58447368	34.49857955	33.96113636	34.70472325
Standard Error	0.689285593	0.938114366	1.113091605	0.530685887
Median	36.075	31.83	28.785	33.24
Mode	34.03	30.76	18.21	18.21
SD	9.501146212	12.44549345	14.76682884	12.35484159
Sample Variance	90.27177935	154.8903071	218.0592341	152.6421107
Kurtosis	1.353006795	1.774683579	0.135617765	1.017435864
Skewness	-0.156737969	1.254169056	0.766532932	0.750989305
Range	62.65	64.88	78.67	84.16
Minimum	4.64	12.91	10.13	4.64
Maximum	67.29	77.79	88.8	88.8
Sum	6761.05	6071.75	5977.16	18809.96
Count	190	176	176	542
<0.05 mm	Nitra	Váh	Hron	All
Mean	69.66357895	67.84119318	65.94875	67.86551661
Standard Error	1.154499842	0.931657301	0.763756415	0.565666262
Median	74.57	69.515	67.46	69.945
Mode	81.61	73.29	73.28	73.29
SD	15.9136821	12.3598308	10.13237384	13.16921598
Sample Variance	253.2452781	152.7654174	102.6649996	173.4282495
Kurtosis	2.948707553	0.560422346	2.905385993	2.491821127
Skewness	-1.694291584	-0.622303001	-0.860619879	-1.204121215
Range	80.95	62.83	76.51	82.74
Minimum	11.64	27.91	17.87	11.64
Maximum	92.59	90.74	94.38	94.38
Sum	13,236.08	11,940.05	11,606.98	36,783.11
Count	190	176	176	542

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Table S3. (Continued).

<0.25 mm	Nitra	Váh	Hron	All
Mean	88.58721053	87.01056818	83.69296591	86.4859631
Standard Error	1.065764983	0.774639924	0.613786869	0.499415847
Median	94.605	88.68	83.87	88.345
Mode	97.65	95.71	77.73	97.65
SD	14.69055649	10.2767599	8.142802977	11.62684712
Sample Variance	215.8124498	105.611794	66.30524032	135.1835739
Kurtosis	6.636447513	1.497088118	0.615778257	5.510322922
Skewness	−2.437403325	−1.20013351	−0.411612746	−1.796546155
Range	82.16	53.66	46.97	82.4
Minimum	17.47	46.21	52.11	17.47
Maximum	99.63	99.87	99.08	99.87
Sum	16831.57	15313.86	14729.962	46875.392
Count	190	176	176	542
<2 mm	Nitra	Váh	Hron	All
Mean	100	100	100	100
Standard Error	2.37144×10^{-16}	8.09739×10^{-17}	1.14514×10^{-16}	9.46223×10^{-17}
Median	100	100	100	100
Mode	100	100	100	100
SD	3.26881×10^{-15}	1.07424×10^{-15}	1.5192×10^{-15}	2.20289×10^{-15}
Sample Variance	1.06851×10^{-29}	1.15399×10^{-30}	2.30798×10^{-30}	4.85273×10^{-30}
Kurtosis	16.46142906	178.0521228	87.5	39.06278563
Skewness	−0.87873242	13.38081123	−9.461662357	−1.494205689
Range	2.84217E-14	1.42109E-14	1.42109E-14	2.84217E-14
Minimum	100	100	100	100
Maximum	100	100	100	100
Sum	19,000	17,600	17,600	54,200
Count	190	176	176	542



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