

## DETERMINATION OF SOME BASIC SOIL CHARACTERISTICS OF BULGARIAN ARABLE SOILS. COMPARATIVE STUDY OF TWO METHODS FOR POTASSIUM AND PHOSPHOROUS EXTRACTION

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Soil diversity of Bulgarian soils is due to the specific climatic, biotic, abiotic and anthropogenic factors. Several well studied methods for different soil physical and chemical characteristics are established. However they provide different data and a comparative study is of interest. All of the samples in this project were arable soils, collected from different regions of Bulgaria. The obtained results for mechanical composition, active acidity (pH), cation exchange capacity, electrical conductivity, organic matter content, mineral nitrogen, potassium and phosphorus are presented. The results for potassium and phosphorous determination are compared as two different methods for extraction were used. A fertility index is presented and compared. The analytical characteristics of both methods for determination of available forms of phosphorus and potassium are evaluated.

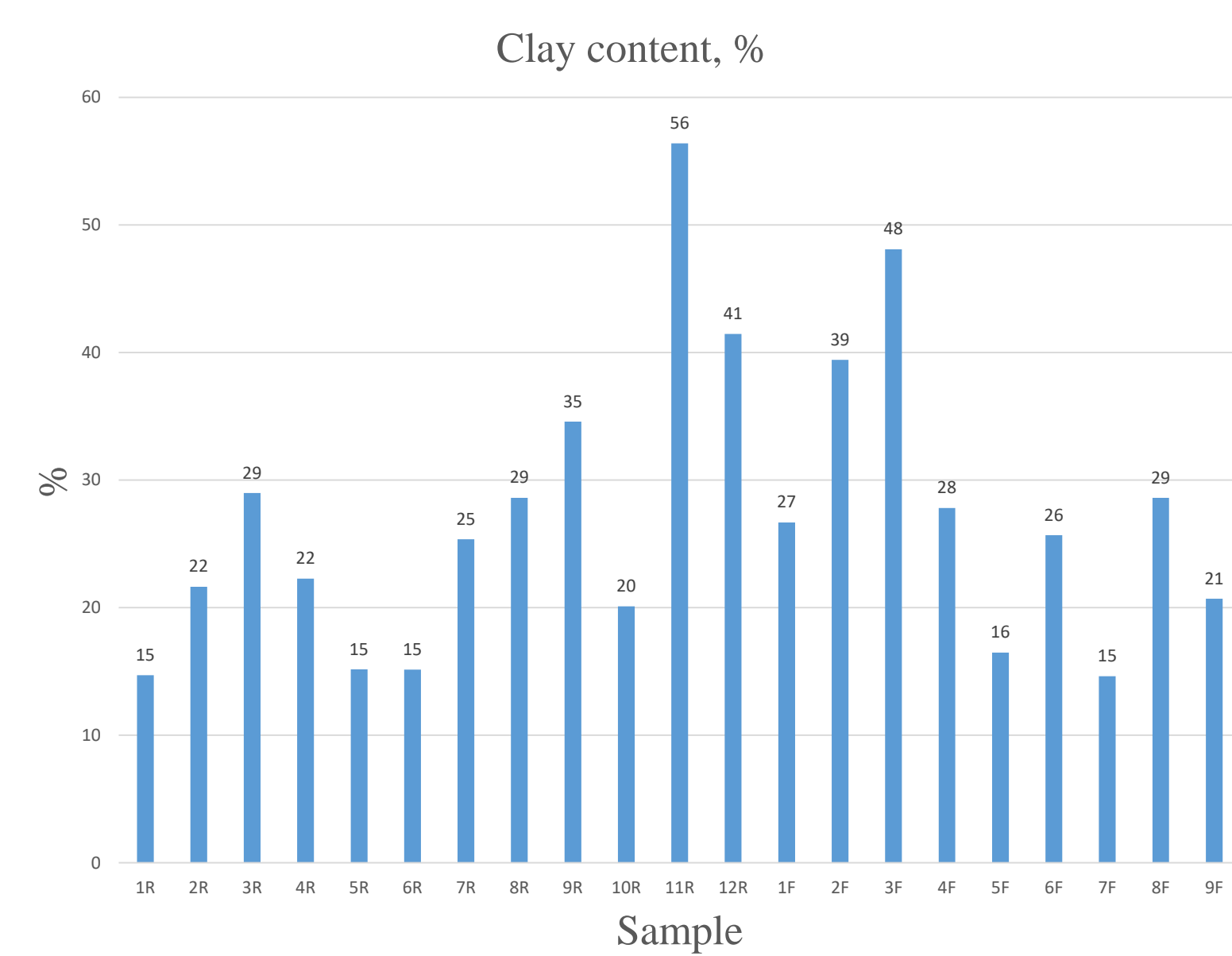


Figure 1: Clay content determination

Table 1: Applied methods for some basic soil characteristics

Basic soil characteristics	Method of extraction	Time of extraction	Method of determination	
pH (H <sub>2</sub> O)	1:2	1 hour	Potentiometric	
Organic matter	Tyurin's method	-	Back titration	
CEC	BaCl <sub>2</sub>	2 hour	ICP-OES	
N	NO <sub>3</sub>	Mehlich 1	5 min	Spectrophotometry
	NH <sub>3</sub>	Mehlich 1	5 min	Spectrophotometry
P(P <sub>2</sub> O <sub>5</sub> )	Acetate-lactate method (Ivanov)	1 hour	Spectrophotometry	
K (K <sub>2</sub> O)	Mehlich 1	5 min	AES	
	Acetate-lactate method(Ivanov)	1 hour	AES	

Table 2: Obtained results for basic soil characteristics

Sample	pH	Organic matter, %	CEC	NO <sub>3</sub> -N, mg/kg	NH <sub>3</sub> -N, mg/kg	P <sub>2</sub> O <sub>5</sub> , mg/100g	K <sub>2</sub> O, mg/100g
1R	6.94	2.48	7.40	5.96	7.46	4.18	38.0
2R	7.38	2.39	7.55	5.97	6.22	5.52	22.6
3R	7.53	2.61	6.45	7.96	7.21	7.34	48.3
4R	7.52	3.35	7.83	6.44	10.65	3.32	24.5
5R	7.40	2.65	7.56	7.46	7.21	4.39	35.6
6R	7.42	2.96	7.45	5.48	7.22	3.72	27.9
7R	7.68	0.98	4.21	2.53	1.77	2.97	14.0
8R	4.54	1.65	5.97	7.43	2.97	11.74	41.7
9R	6.97	2.69	4.70	14.91	11.18	1.54	35.2
10R	6.47	2.80	4.44	13.36	7.67	3.12	42.3
11R	7.21	2.64	6.90	7.49	2.50	3.42	26.8
12R	7.67	1.93	7.43	4.48	1.74	8.53	29.8
1F	7.49	2.80	5.10	4.01	8.76	6.87	38.0
2F	7.84	2.17	5.29	3.48	7.70	7.07	31.0
3F	8.05	2.56	4.31	4.48	9.70	10.27	56.5
4F	7.88	3.02	5.12	3.01	3.01	7.10	48.6
5F	7.42	2.87	5.12	5.93	11.37	7.22	38.8
6F	7.57	2.66	5.63	13.36	4.21	5.24	27.0
7F	7.67	4.04	3.51	7.43	4.71	12.16	42.4
8F	7.76	3.90	3.58	9.49	3.49	6.53	31.7
9F	7.75	4.12	4.38	15.42	2.74	9.93	26.2
10F	7.89	4.02	6.44	8.94	8.44	2.69	27.7
11F	8.26	1.61	5.97	2.50	10.74	13.05	17.5
12F	8.40	1.65	6.98	5.48	7.98	43.78	25.7

### Acetate-lactate method



### Mehlich 1

Figure 2: Schematic representation of Mehlich 1 and Acetate-lactate method (Ivanov) for extraction and determination of K and P in soil samples.

Table 3: Summary data for phosphorous and potassium determination. Fertility indexes.

Sample	Mehlich 1		Acetate-lactate method		Mehlich 1		Acetate-lactate method	
	P <sub>2</sub> O <sub>5</sub> , mg/100g	Fertility index	P <sub>2</sub> O <sub>5</sub> , mg/100g	Fertility index	K <sub>2</sub> O, mg/100g	Fertility index	K <sub>2</sub> O, mg/100g	Fertility index
1R	1.90	Low	4.18	Very low	8.6	High	38.0	Very high
2R	1.06	Very low	5.52	Very low	3.5	Low	22.6	Medium
3R	1.41	Very low	7.34	Low	8.2	High	48.3	Very high
4R	2.86	Low	3.32	Very low	6.5	Medium	24.5	Medium
5R	1.77	Low	4.39	Very low	6.9	Medium	35.6	High
6R	2.52	Low	3.72	Very low	6.3	Medium	27.9	Medium
7R	0.58	Very low	2.97	Very low	2.0	Low	14.0	Low
8R	1.70	Low	11.74	Low	7.7	Medium	41.7	Very high
9R	1.64	Low	1.54	Very low	14.8	High	35.2	High
10R	2.67	Low	3.12	Very low	18.0	Very high	42.3	Very high
11R	1.41	Very low	3.42	Very low	3.9	Low	26.8	Medium
12R	1.17	Very low	8.53	Low	3.6	Low	29.8	High
1F	0.79	Very low	6.87	Low	7.7	Medium	38.0	High
2F	0.63	Very low	7.07	Low	6.2	Medium	31.0	High
3F	1.01	Very low	10.27	Low	15.4	High	56.5	Very high
4F	0.85	Very low	7.10	Low	11.1	High	48.6	Very high
5F	0.78	Very low	7.22	Low	6.9	Medium	38.8	High
6F	0.48	Very low	5.24	Very low	5.5	Medium	27.0	Medium
7F	2.55	Low	12.16	Medium	8.6	Medium	42.4	Very high
8F	1.77	Low	6.53	Low	6.2	Medium	31.7	High
9F	1.73	Low	9.93	Low	2.6	Low	26.2	Medium
10F	2.51	Low	2.69	Very low	8.1	Medium	27.7	Medium
11F	3.07	Low	13.05	Medium	3.3	Low	17.5	Medium
12F	0.92	Very low	43.78	Very low	7.7	Medium	38.0	High

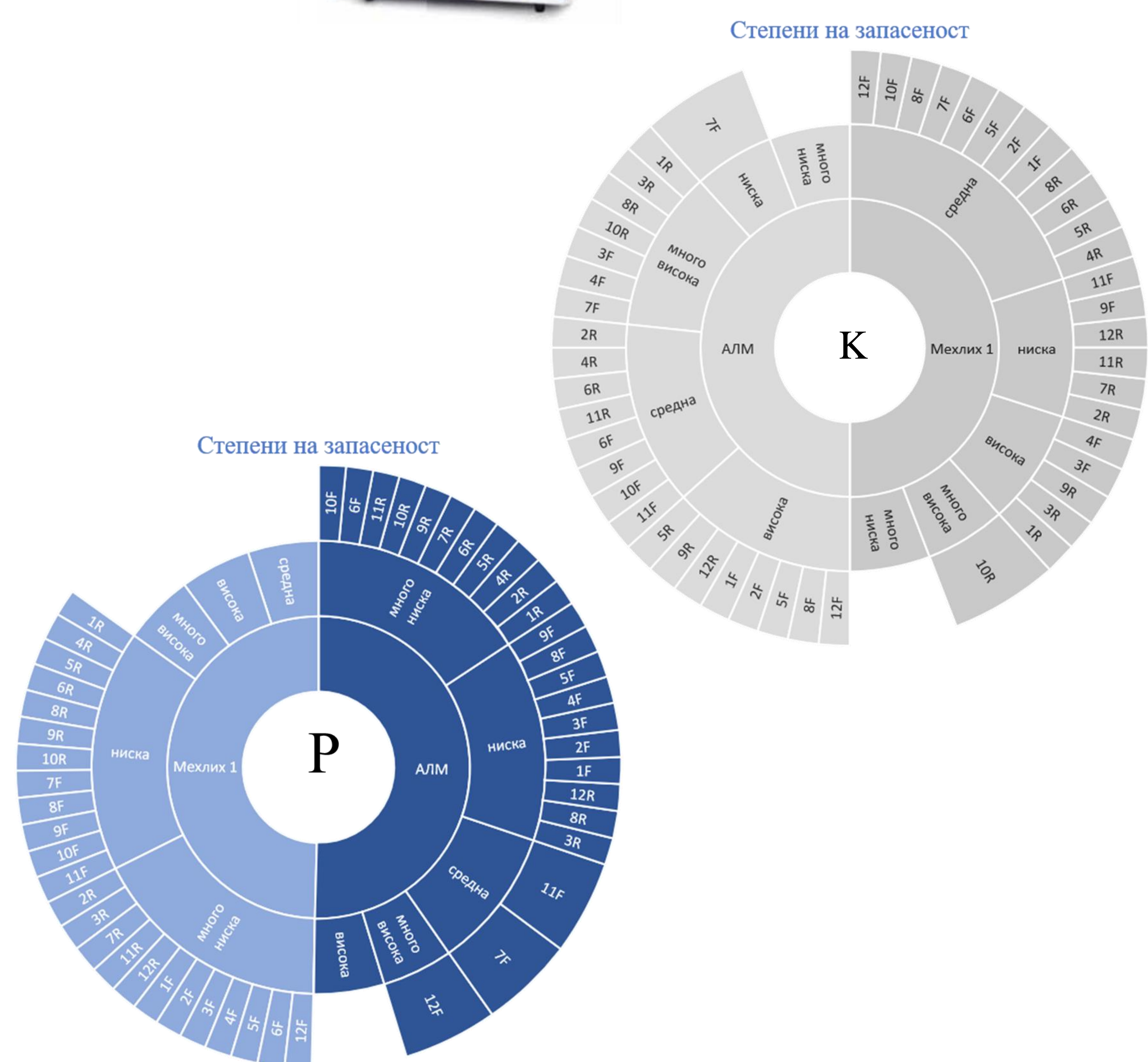


Figure 3: Degrees of potassium and phosphorus reserves

Acknowledgments: This research is carried out thanks to contract 11956, NIS at UCTM. We thank Sembodja Ltd. for the provided samples for analysis.