THE EFFICIENCY OF THE NUTRIENT DOSES WITH SEVERAL CROPS IN FUNCTION OF THE SOIL SUPPLY

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Abstract
From a surface of about 50 ha, located in District Olt, there have been taken soil samples on 0-20 cm depth and there were made agrochemical analyses. In function of the results of the analyses there were calculated the fertilizer doses N, P, K, active ingredients, for the fertilization of the, wheat, corn, sunflower and oil seed rape.

Key words: *agrochemical analyses, fertilizers, yields*

INTRODUCTION

The active ingredient doses from the usual fertilizers that are needed for the field crops are calculated in function of the supplying status of the soil with a certain element as well as well as in function of the bases saturation degree and the value of the crops.

MATERIAL AND METHOD

A surface from the Slatina was split in 13 agrochemical plots with similar properties and sizes. From each plot there was taken a soil average sample. There were determined: the pH in hydrous suspension, the sum of the exchangeable bases, SB, the total nitrogen, Nt, and the nitric nitrogen, NO_3, the humus content, H, phosphorus, P_{Al} , potassium, K_{Al} (extracted from solution of acetate lactate of ammonia at pH = 3.7, marked as Al). The analyses were carried out after official methods, approved in Romania (the National Institute for Pedology and Agrochemistry, 1980, 1981).

From the experimental data there were calculated the agrochemical indicators: the total capacity for cationic exchange T, the bases saturation degree V_{Ah} and the nitrogen indicator, after the downward formulas:

T = SB + Ah; $V_{Ah} = \frac{SB \cdot 100}{SB + Ah}$;

$$IN = \frac{H\% \cdot V_{Ah}\%}{100}$$

The calculus of the fertilizer doses was made using the formulas developed by the ICPA Bucharest on the basis of the experimental data, of the Mitscherlich type formulas and the statistical math methods of computing the experimental data (1980). These formulas are:

$$NOET = \frac{\lg(2{,}303 \cdot C \cdot Rs \cdot \frac{V.U.R.}{C.U.I.}}{C}$$

$E = a(IA)-b(IA)^2 + d.Rs$

$DOE_{N,P2O5,K2O} = NOET_{N,P2O5,K2O} – E_{N,P2O5,K2O}$, where:
NOET – the total N, P_2O_5, K_2O (kg/ha) optimal economical
E – the soil supply of nutrients N, P_2O_5, K_2O (kg/ha)
DOE – the optimal economical doses of N, P_2O_5, K_2O (kg/ha)
Rs – the expected yield (kg/ha)
VUR – the value of the vegetal yield (lei/kg)
CUI – the cost of the fertilizers (lei/kg, N, P_2O_5, K_2O)
IA – the agrochemical indicators: IN, P_{AL} şi K_{AL}
C,a,b,d, - constants

RESULTS AND DISCUTIONS

Within the table nr.1 there are the values of the agrochemical indicators for all 13 plots. The table 2 contains the way of interpreting the analytical data. In the table 3 there are the doses of active ingredients that are needed for several crops. In this table there are two different values. For the plots 1, 2, 4, 9, 11 and 13 it was used the IN = IA = 1.5 and for the 3,5,6,7,8,10 and 12 plots it was used the IA = IN = 2.5 for the calculus of the nitrogen doses. For the calculus of the P_2O_5 and K_2O doses there were used the values of IA = P_{AL} = 40 ppm and IA = K_{AL} = 180 ppm.

Table 1

The average values of the agrochemical indicators

Plot nr.	pH	Ah me/ 100g sol	SB me/ 100g sol	T me/ 100g sol	V_{Ah} %	Nt %	N_{NO3} ppm	H %	IN	P_{AL} ppm	K_{AL} ppm
1	5,93	5,13	14,81	19,94	74,28	0,097	5,793	1,836	1,363	30,59	279
2	6,20	3,53	14,53	18,06	80,43	0,120	5,123	2,228	1,791	20,56	259
3	5,84	5,45	14,95	20,40	73,27	0,173	8,470	3,205	2,348	95,80	317
4	5,99	4,09	14,62	18,71	78,15	0,121	10,712	2,287	1,787	32,11	177
5	6,34	2,34	13,73	16,07	85,44	0,165	7,950	3,083	2,634	31,35	209
6	6,10	3,00	13,91	16,91	82,27	0,153	10,785	2,837	2,333	60,70	225
7	7,18	0,05	13,48	13,53	100	0,110	4,980	2,032	2,032	21,32	228
8	5,84	4,62	14,88	19,50	76,32	0,183	10,025	3,397	2,592	49,17	188
9	6,60	2,51	13,51	16,02	84,32	0,124	9,583	2,329	1,963	30,85	179
10	5,97	4,41	14,92	19,33	77,18	0,182	9,874	3,386	2,613	28,84	165
11	6,05	3,45	14,20	17,65	80,43	0,122	12,220	2,264	1,820	59,44	198
12	5,76	6,07	15,03	21,10	71,23	0,183	9,837	3,394	2,417	44,14	205
13	5,71	6,37	15,22	21,59	70,48	0,112	5,345	2,097	1,477	24,08	250

Table 2

The interpretation of the experimental data

Supply	Nt %	IN	H %	P_{AL} ppm	K_{AL} ppm	N_{NO3} ppm
Very weak	-	-	under 1	under 8	-	under 6
weak	under 0,10	under 2	1-2	8-18	under 66	6
average	0,10-0,15	2-4	2-3	18-36	66-132	9
Good	0,15-0,20	4-6	3-5	36-72	132-200	14
high	0,20-0,30	over 6	5-8	72-144	200-400	23
Very high	over 0,30	-	over 8	over 144	over 400	over 23

Table 3

The optimal doses of fertilizer, active ingredient required for the expected yields

The expected yield Kg/ha	*The dose of a.i., kg/ha*			
	N		*P_2O_5*	*K_2O*
	Plots 1,2,4,9,11,13	Plots 3, 5-8,10,12		
WINTER WHEAT				
3000	101	86	-	14
4000	124	109	24	41
5000	142	127	45	62
6000	156	142	62	81
7000	169	154	76	96
8000	180	165	89	110
CORN				
3000	76	56	-	-
4000	106	86	11	2
5000	134	113	27	26
6000	157	146	40	47
7000	180	169	50	65
8000	201	181	59	81
9000	220	200	67	95
SUNFLOWER				
2000	79	65	25	18
3000	107	93	76	60
4000	126	112	117	92
5000	140	126	155	106
OILSEED RAPE				
3000	119	104	61	52
4000	136	121	91	79

CONCLUSIONS

It can be said that the studied soils are moderate acid, moderate – good supplied with nitrogen and humus. They have low values of nitrogen indicators due to the acid reaction of the soil. They are also

moderate supplied with phosphorus and well supplied with potash.

There are recommended fertilizers with basic physiological reaction (nitrolime) and enriched in phosphorus (16-48-0, 12-52-0).

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