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ANALYSIS OF FERTILISER APPLICATION EFFICIENCY AND ITS IMPACT ON YIELD

Rational use of fertilisers is the most important factor in increasing the yield and quality of agricultural products. In the conditions of market economy, the agricultural sector strives for cost optimisation and sustainable development, which requires the analysis of the impact of mineral and organic fertilisers on crop yield. The purpose of the study is to identify the dynamics of the application of organic and mineral fertilisers 2019-2023, and to assess their impact on crop yield.

Table 1 – Indicators of mineral and organic fertiliser application in agricultural organisations 2019–2023

	2019	2020	2021	2022	2023
Mineral fertilisers for agricultural crops					
Total, Kt.	826,2	956,7	902,6	1031,6	1048,9
Per hectare of sown area, kg					
cereals	171	194	192	209	230
potato	296	325	320	332	343
vegetables	228	256	225	266	224
sugar beet	430	442	431	430	430
rapeseed	243	275	293	322	329
forage crops	116	138	122	154	146
Organic fertilisers for agricultural crops					
Total, Mt.	48,7	51,1	49,3	50,4	49,1
Per hectare of sown area, tonnes					
cereals	5,3	5,7	5,6	5,4	6,0
potato	37,1	36,0	37,4	35,2	36,6
vegetables	9,0	7,2	5,3	6,3	4,4
sugar beet	42,6	44,6	43,0	41,5	39,2
rapeseed	1,4	1,6	1,6	1,8	1,8
forage crops	12,6	13,2	13,1	13,8	12,3

The growing trend in the use of mineral fertilisers indicates a desire for a quick effect due to high nutrient concentrations, which has a positive effect on short-term yield gains. However, increasing dosages requires a cautious approach: over-application can negatively affect soil health and deplete its natural potential. On the other hand, stable use of organic fertilisers improves soil structure and humus accumulation, which ensures long-term fertility, although the effect is apparent.

Table 2 – Yield indicators of main crops in agricultural organisations 2019–2023

Agricultural crop (centner/ha)	2019	2020	2021	2022	2023
cereals	30,4	35,1	29,9	34,6	33,5
potato	282	256	253	278	327
vegetables	234	204	181	214	186
sugar beet	521	481	453	453	479
rapeseed	16,7	20,5	18,9	21,3	23,2
forage crops	340	334	414	459	309

Observations of the dynamics of fertiliser application and yield indicators in agricultural organisations 2019-2023 allow us to highlight several key trends. From Table 1, we can observe an increase in the volume of mineral fertilisers on arable land from 165 to 209 kg/ha and an increase in dosages for certain crops, especially for cereals and leguminous crops from 171 to 230 kg/ha and potatoes from 296 to 343 kg/ha correlates with an increase in their yields shown in Table 2. The yield of grain and leguminous crops for this period increased from 30.4 to 33.5 kg/ha, and potatoes – from 282 to 327 kg/ha. A similar pattern can be traced in rape – the dosage of mineral fertilisers increased, and the average yield increased from 16.7 to 23.2 kg/ha. In addition, the steady application of organic fertilisers, about 49 million tonnes per year, helps to maintain soil fertility, which is most noticeable for crops with higher soil structure requirements, such as potatoes. At the same time, the results for vegetable yields showed a decrease in yields from 234 to 186 centner/ha and a decrease in sugar beet yields from 521 to 479 centner/ha indicate that increasing mineral fertiliser inputs alone is not sufficient.

The analysis has shown that the increase in the rates of mineral fertiliser application in agricultural organisations 2019–2023 positively correlates with the growth of yields of major crops, especially cereals, potatoes and rapeseed. The yield of sugar beet does not show stable growth when increasing fertilisers, which indicates the influence of additional factors.