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VARIABILITY OF THE LEAF OF *TRITICUM AESTIVUM* L. UNDER CONDITIONS OF DIFFERENT SOIL FERTILIZATION.

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The leaf is the most important part of the photosynthetic apparatus and the main organ in determining plant productivity. Traits of the leaf such as chloroplast pigment content, leaf surface, and dry matter weight are known to have great influence on the yield of cultivated plants. During grain formation, wheat is supplied with carbohydrates of current photosynthesis created for the most part by activity in organs of the uppermost internodes. The leading role in this process is ascribed to the terminal leaf. Chlorophyll content is one of the indicators of photosynthetic activity (L a r c h e r, 1995). Many authors have proved that chlorophyll and carotenoid synthesis is dependent upon mineral nutrition. Nitrogen is a structural element of chlorophyll and protein molecules and as such affects the formation of chloroplasts and accumulation of chlorophyll in them (T u c k e r, 2004; D a u g h t r y et al., 2000). The concentration of this element in green leaves is related to chlorophyll content and therefore indirectly to one of the basic plant physiological processes, photosynthesis (H a b o u d a n e et al., 2002; A m a l i o t i s et al., 2004; L e l y v e l d et al., 2004; C a b r e r a, 2004). Phosphorus affects stability of the chlorophyll molecule in plants, especially with the advent of unfavorable weather conditions in the fall.

Mineral nutrition significantly influences on the dynamics of leaf surface formation and the extent of leaf area, which is reflected in the sum total of leaf surface, the photosynthetic potential, and net photosynthesis. Of all macrometabolic elements, the greatest influence on development of plants and their leaf surface is exerted by nitrogen, whose action is enhanced by phosphorus and to lesser extent by potassium. Pigment content, leaf surface, and dry matter weight can be used as a potential indicator of nutritional deficiency in the soil (T e j a d a – Z a r c o et al., 2004).

Table 1. Chlorophyll content in the flowering phase (mg/g).

	O	**N**	**NPK**	**NP**	**NK**	***average***
Lazarica	2.14	3.79	2.50	3.31	2.75	2.90
Studenica	1.50	3.51	2.49	3.37	2.50	2.67
Matica	1.67	2.50	2.78	3.83	2.21	2.60
KG 56	2.14	2.79	3.08	4.95	3.30	3.25
KG 100	1.59	2.86	3.00	4.12	3.35	2.99
average	1.81	3.09	2.77	3.92	2.82	

Complex physiological investigations were carried out in the flowering phase on five wheat (*Triticum aestivum* L.) cultivars growing on a test plot of the Small Grains Research Center in Kragujevac, Serbia. Terminal leaves of wheat cultivars were taken from plants of four variants of soil fertilization (N, NPK, NP, and NK) and from ones on unfertilized soil. Pigment content was determined by the spectrophotometric method and calculated according to W e l l b u r n (1994). Leaf surface was measured by the method of leaf parameters.

The obtained results showed that chlorophyll content is dependent on mineral nutrition. The lowest chlorophyll content is measured on unfertilized soil. Fertilization with nitrogen and phosphorus (NP) was the most favorable variant (Table 1). This is in keeping with published data indicating that nitrogen and phosphorus exert the greatest influence the chlorophyll content. Nitrogen is a structural element of chlorophyll and protein molecules and as such affects formation of chloroplasts and accumulation of chlorophyll in them (D a u g h t r y, 2000; T u c k e r, 2004). The influence of phosphorus on formation of green pigments in the leaf primarly depends on its concentration. Phosphorus affects the stability of chlorophyll in plants, especially with the advent of unfavorable weather conditions in the fall. The secont most favorable fertilization variant was the N variant (only nitrogen added to the soil as fertilizer). Even though nitrogen is the most important mineral element for biosynthesis of chlorophyll, adding nitrogen to the soil can have negative as well as positive effects, since an excess of nitrogen shortens the life of leaves, increases their sensitivity, and lowers their resistance to plant diseases, which leads to decrease of chlorophyll content. The NK variant (nitrogen and potassium added in combination) was unfavorable because chlorophyll content is known to decrease in the presence of a phosphorus deficit. Phosphorus deficiency inhibits plant growth and chlorophyll synthesis, which gives plants experiencing it a dark green color. It is interesting that the combination of three elements (nitrogen, phosphorus, and potassium added as NPK fertilizer) was the most unfavorable variant of fertilization. This can be attributed to the fact that Cl from potassium fertilizer can have negative effects on the photosynthetic apparatus in plants.

A second important characteristic of the leaf is leaf surface. It is the basic photosynthetic area. Mineral nutrition significantly affects the dynamics of formation leaf surface and the extent of leaf area which is reflected in the sum total of leaf surface, the photosynthetic potential, and net photosynthesis. Of all ma-

Table 2. Leaf surface (cm^2) and leaf dry matter weight (g) in the flowering phase.

	Leaf surface						*Dry matter weight*					
	O	N	NPK	NP	NK	*average*	O	N	NPK	NP	NK	*average*
Lazarica	0.11	0.21	0.20	0.19	0.25	0.19	5.54	22.40	10.70	19.87	28.23	17.35
Studenica	0.15	0.27	0.21	0.25	0.29	0.23	10.95	28.20	11.35	21.00	26.56	19.61
Matica	0.11	0.24	0.25	0.29	0.33	0.24	7.43	17.56	21.68	18.40	27.90	18.59
KG-56	0.15	0.20	0.33	0.24	0.28	0.24	7.26	9.89	31.32	18.91	25.43	18.56
KG-100	0.20	0.32	0.26	0.31	0.28	0.27	6.67	20.40	18.66	20.54	14.56	16.16
average	0.14	0.25	0.25	0.26	0.29		7.57	19.69	18.74	19.74	24.54	

crometabolic elements, the greatest influence on development of plants and their leaf surface is exerted by nitrogen, whose action is enhanced by phosphorus and to lesser extent by potassium. Nitrogen is one of the most effective factors during the whole period of leaf growth. Phosphorus and potassium have smaller significance. The variants of soil fertilization differ in the rate of plant growth and decrease of leaf surface, especially its maximum extent. The most favorable fertilization variant for the extent of leaf surface was the NK variant (nitrogen and potassium added to the soil) (Table 2). The combination of three mineral elements (NPK fertilizer) has no great influence on leaf surface. One of the reasons for this is the competition of plants for sunlight. Thus, because the NPK variant was located on the edge of the experimental plot in favorable light conditions, it yielded smaller leaf surface. There are also differences in the dynamics of growth and extent of leaf area between the variants of soil fertilization. These differences appear to be consequences of different influence of mineral nutrition on plant growth.

Dry matter weight is a very important factor for determination of mineral element needs for photosynthesis. Nitrogen and phosphorus increase synthesis of organic compounds, with the result that the plants have greater dry matter weight. On unfertilized soil, leaf dry weight was the lowest in all wheat cultivars. It increased with application of nitrogen fertilizers because nitrogen uptake is better when this element is added to the soil (D e l d e n, 2001). The most favourable fertilization variant for dry matter weight was the NK variant (Table 2).

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