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THE DEPENDENCE OF LIGHT-INDUCED VIOLAXANTHIN TRANSFORMATION ON THE RATIO OF STROMA LAMELLAE

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In our earlier publications (MARÓTI, *1976;* MARÓTI and GÁBOR, 1976) it was assumed that there is firstly cyclic electron transport in the stroma lamellae, and this is independent of the linear ($H_2O \rightarrow NADP^+$) electron flow found in the grana. It is known that in the inductional phase photosynthesis the linear electron transport hardly functions (WALKER, 1976). The light-induced acidification of the intrathylakoid space (optimal: pH 5) activates the de-epoxidase enzyme (HAGER and PERZ, 1970), therefore the decrease in violaxanthin is the endogeneous indicator of the temporal accumulation of protons (SIEFERMANN—HARMS et al., 1980). In the loculus the protons are even capable of accumulation (due to the cyclic electron transport) when the linear electrontransport is hindered (SIEFERMANN—HARMS et al., 1980; CROWTHER and HIND, 1980). On the basis of the afore-mentioned it is expectable that the amount of violaxanthin transformed in the inductional phase would be proportional to the area of the stroma lamellae.

For our experiments such inbred corn lines were used: *Zea mays* L., *Pioneer* 165 and 523, which significantly differ in their mesophyll chloroplasts even in long-day light (light-dark periods, LDP, of 16—8 hours), and in short light-dark periods the ratio of stacked and single lamellae varies diversely (MARÓTI et al., 1982).

The de-epoxidation of violaxanthin developing on the effect of strong light of 1, 2 and 4 min. duration (400—900 Wm^{-2}) was studied with discs taken from the 4th leaf of 5 weeks old plants. The pigments were extracted, separated and measured (MARÓTI and GABNAI, 1971). To determine the ratio of the stroma lamellae and partition cc. 30 chloroplast membranes — selected according to types and treatment with (—) light — were measured on electronmicroscopic pictures.

The amount of violaxanthin transformed on the effect of strong light shows tight relationship with the ratio of the stroma lamellae in the first and second min. (Table 1).

Table 1. Decrease of violaxanthin (μg/mg chlorophyll a) in the 4th leaf of 5 weeks old corns on the effect of 2 min. long (800 Wm^{-2}) strong light. The ratio of stroma lamellae before de-epoxidase experiments developed on the effect of 16—8 hours and 30—15 min. long LDP-s and 32 Wm^{-2} light intensity, resp.

Corns were grown in light-dark periods	Conversion of violaxantin (μg/mg chlorophyll a/2 min')		% of stroma lamellae	
	P 165	P 523	P 165	P 523
16—8 h	6	17	30	48
30—15 min	20	11	46	35

In the leaves of plants utilizing well the short period of light (MARÓTI, 1981) — in the inductional phase of photosynthesis — the de-epoxidation of violaxanthin develops faster than in those leaves of plants on the development of which the short LDP is unfavourable.

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