FEATURES OF THE CIRCULAR DICHROISM SPECTRUM OF PROTEIN FRACTIONS FROM OPAQUE-2 MAIZE

A. N. Vinnichenko, V. S. Fedenko, and O. A. Livenskaya

UDC 547.962.2+547.962.5+633.15

Spectral investigations are permitting characteristic features of protein fractions to be revealed for the selection of mutant forms of maize [1, 2]. We have previously studied the circular dichroism (CD) spectra of protein fractions of maize [3]. In order to determine the influence of the nature of the genotype on the type of CD spectra, we have investigated protein fractions isolated from the grain of ordinary maize and maize mutants in relation to the opaque-2 gene. The procedure for isolating the substances and the conditions of obtaining the spectra have been described previously [3].

The change in genotype was shown most clearly in the CD spectra of the albumins and globulins, the maxima of which were shifted bathochromically by 3-4 nm (Fig. 1), while for the zeins and glutelins the value of the long-wave shift of the bands was smaller. It must be mentioned that a change in the characteristic of the albumins of maize mutants in comparison with the ordinary analogs has also been observed in an investigation of IR spectra [1, 2].

For the comparative characterization of the albumins of the initial and mutant forms of various forms of maize we found the ratio of the CD optical densities at 208 and 222 mm ($\Delta D_{222}/\Delta D_{208}$), which has been used previously [4] in the investigation of membrane proteins. The $\Delta D_{222}/\Delta D_{208}$ ratio is a convenient parameter for evaluating a spectral shift, and the values found for the albumins of the mutants are statistically higher. The fact established may be due to a rise in enzymatic activity [5] and to a change in the amount of optically active substances of nonprotein nature [1].

Thus, the proposed parameter found from the CD spectra of albumins can be used for selecting mutant forms of maize.

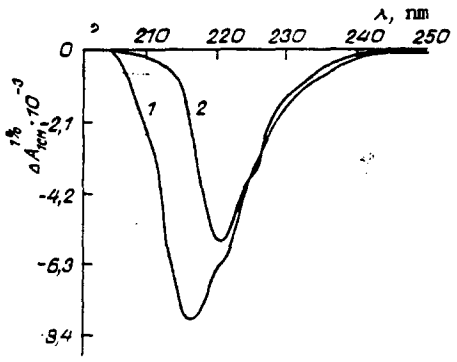

Fig. 1. CD spectra of the albumins of the grains of the initial (1) and mutant (2) forms of maize (line A 204).

TABLE 1

Line of maize	$\Delta D_{222}/\Delta D_{208}$	
	initial form	mutant form
A 204	6,5±0,52	13.4±0,34
W 155	6,2±0.25	11.5±0,69
W 64 A	6,7±0.27	13,6±0,49
Wf 9	11,4±0,34	13,4±0,44

Scientific-Research Institute of Biology, Dnepropetrovsk State University. Translated from Khimiya Prirodnykh Soedinenii, No. 1, pp. 131-132, January-February, 1990. Original article submitted March 7, 1989.

0009-3130/90/2601-0108$12.50

LITERATURE CITED

1. V. S. Fedenko, A. N. Vinnichenko, and O. G. Mirosh, *Fiziol. Biokhim. Kul't. Rast.* 17, 501 (1985).
2. A. N. Vinnichenko, V. S. Fedenko, and O. G. Mirosh, USSR Inventors' Certificate No. 1,201,769; Byul. Isobret, No. 48, 180 (1985).
3. A. N. Vinnichenko, V. S. Fedenko, N. P. Kotsyubinskaya, and O. A. Levinskaya, *Khim. Prir. Soedin.*, 615 (1987).
4. I. A. Bolotina, *Biophysics. Advances in Science and Technology* [in Russian], VINITI, Vol. 4, Moscow (1975), p. 133.
5. A. N. Vinnichenko and N. P. Kotsyubinskaya, *The Molecular Foundations of the Action of Exogenous and Endogenous Factors on the Organism* [in Russian], DGU, Dnepropetrovsk (1987), p. 59.

INFLUENCE OF ZINC IONS ON COTTON PYROPHOSPHATASE

B. O. Beknazarov

UDC 633.511.677.15

Continuing a study of the physicochemical properties of cotton pyrophosphatase, we have investigated the influence of zinc ions on the hydrolytic activity of the enzyme, which exhibits its maximum action at pH 8.6 [1, 2].

The necessity for the presence of zinc ions in the hydrolysis of pyrophosphate has been reported in a number of papers by S. M. Avaeva et al. [3, 4].

The pyrophosphatase activity was measured by a method described previously [5].

The results of our investigations have shown that with a rise in the concentration of zinc ions in the incubation medium the activity of cotton inorganic pyrophosphatase also increases (Fig. 1, curve 1). Higher concentrations of these ions led to an inhibition of the hydrolytic activity of the enzyme. Thus, the maximum activity of the pyrophosphatase is reached at 1 mM $ZnCl_2$ in the medium (at a concentration of PP_i of 3 mM). A further rise in the concentration of zinc ions in the incubation mixture is accompanied by an inhibition of hydrolytic activity of the enzyme, and at a concentration of zinc ions of 4 mM their inhibition already amounts to 70%.

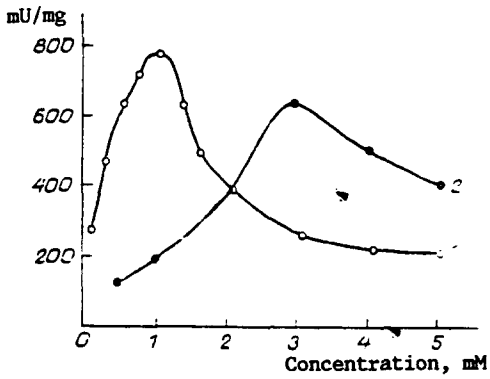

Fig. 1. Inhibition of the Zn^{2+}-activated hydrolysis of pyrophosphate: 1) with an excess of metal at a substrate concentration of 3 mM; 2) with an excess of substrate at a constant concentration of $ZnCl_2$ of 0.5 mM.

V. I. Lenin Tashkent State University. Translated from Khimiya Prirodnykh Soedinenii, No. 1, pp. 132-133, January-February, 1990. Original article submitted March 20, 1989.