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PEROXIDASE ISOENZYMES IN COTTON FIBER

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It has been shown by electrophoresis that cotton fiber peroxidase has several molecular forms. Lines L-2 and T-16 of the species Gossypium barbadense *differ from lines L-175 and L-466 of the species* Gossypium hirsutum *by the presence or absence of individual forms on chromatograms and also by the intensity of the coloration of some of them.*

An important role in the formation of cellulose is played by the enzyme peroxidase, which participates in the thickening of the fiber and also in reactions transforming phenolic acids associated with the polysaccharides of the cell walls [1].

In the present paper we consider the possibility of using the isoforms of peroxidase as genetic markers. One of the methods of identifying plants with respect to species and variety is the study of the multiplicity of the forms of peroxidase by electrophoresis [2]. We have investigated cotton fiber from various lines at the age of twenty days, these lines differing by the type of flower (T-16 and L-2) of the species *Gossypium barbadense* and by the strength of the fiber (L-175 and L-466) of the species *G. hirsutum*.

Electrophoresis showed the presence in the fibers of lines L-2 and T-16 of four isoforms with relative electrophoretic mobilities (REMs) of 100, 95, 66, and 58 (Fig. 1). For convenience of determination, the relative mobility of a powerful component of the spectrum readily identified on the chromatograms was taken as 100. The REMs of the other protein bands were calculated relative to the position of this band.

Particular interest is presented by lines L-175 and L-466 of the species *G. hirsutum*. The electrophoretic investigation showed that L-75 is characterized by zones with REMs of 95, 66, and 58, and L-466 by the presence of a broad minor fourth zone with a REM of 115, present in neither L-2 and T-16 nor L-175. Thus, isoenzyme peroxide analysis can be used for comparing varieties with one another. For the lines L-2 and T-16 of *G. barbadense* four zones with the same REMs appear on zymograms, and for L-175 and L-466 of the species *G. hirsutum* three zones with REMs of 58, 66, and 95 identical with the corresponding zones for L-2 and T-16, while L-175 gave no zone with a REM of 100, and L-466 showed an extra zone with a REM of 115. Consequently, the isoenzyme spectra of different species differ both in the number of components and in their electrophoretic mobilities.

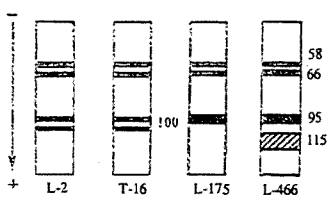

Fig. 1. Electrophoretic spectra of the peroxidases of cotton fibers from 20-day bolls.

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EXPERIMENTAL

Isolation of Enzyme Preparations. Elements of the fruit were taken in the period of the formation of the secondary cell wall of the cotton fiber. The cell walls were broken down with liquid nitrogen, and the resulting powder was treated with 5-7 volumes of Tris-glycine buffer, pH 8.3, containing 1 M NaCl. The extract was centrifuged at 10,000 rpm for 30 min, and the supernatant was dialyzed against distilled water and freeze-dried.

Peroxidase activity was determined spectrophotometrically by A. N. Boyarkin's method [3].

The electrophoretic separation of the peroxidases was carried out in alkaline (pH 8.9) PAAG (7.5%) by Davis's method [4], with revelation by benzidine.

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