VARIATION OF BASIC LEGUMIN COMPONENTS IN THE GENUS PISUM REVEALED BY ISOELECTROFOCUSING

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Previously reported data indicated the usefulness of electrophoretic analysis of seed proteins in the classification of Pisum forms (1,2). Consequently, investigations attempting to solve some taxonomic problems in Pisum by means of electrophoretic analysis of proteins were recently undertaken. This report presents data showing usefulness of isoelectrofocusing (IEF) to detect variation in basic legumin components.

The investigated material comprised 107 Pisum lines representing P. elatius (5 lines), P. humile (3 lines), P. sativum (82 lines), P. abyssinicum (12 lines), and P. fulvum (5 lines). The investigated lines originated from the Weibullsholm Collection, Sweden (96 lines), the John Innes Institute, England (6 lines), the Vavilov Institute, USSR (2 lines), the Gatersleben Collection, GDR (1 line), the University of Melbourne, Australia (1 line), and the Hebrew University of Jerusalem, Israel (1 line). For each line seed samples harvested in two years were analyzed.

Preparations of legumin fractions were obtained as described previously (2). IEF analysis was performed in gel slabs, containing 2% LKB Ampholines and 6M urea, with the use of LKB Multiphor apparatus. The range of the pH gradient was 7.0-10.0.

Under the conditions applied, the IEF analysis yielded multi-band patterns of basic legumin components. Due to a high resolving power of the IEF technique it was possible to reveal considerable variation of the components in the lines investigated (Fig. 1). Significant variation was found in the group of closely related P. elatius, P. humile and P. sativum. Lines of P. abyssinicum showed rather uniform patterns with no distinct species-specific features. Of the taxons examined, P. fulvum was distinguished by the lack, of protein bands focused in pH range 9.5-9.7 (no correction for the presence of urea in gels was made). All the investigated P. fulvum lines--which proved to vary with respect to urea-PAGE patterns of acidic legumin components (2)--showed the characteristic species-specific IEF pattern of basic legumin components.

The species-specific electrophoretic pattern of basic legumin components has been already reported for P. fulvum (2). However, under the previously applied conditions of electrophoretic analysis, SDS-PAGE arid urea-PAGE, no satisfactory resolution of basic legumin components of Pisum could be achieved. IEF analysis proved to be an efficient method for separation of the components. With the use of IEF the variation of the components in P. elatius, P. humile, and P. sativum, not observed previously, has been revealed and the distinctness of P. Fulvum has been definitely confirmed. Therefore, IEF pattern of basic legumin components appears to be a useful character in Pisum taxonomy.

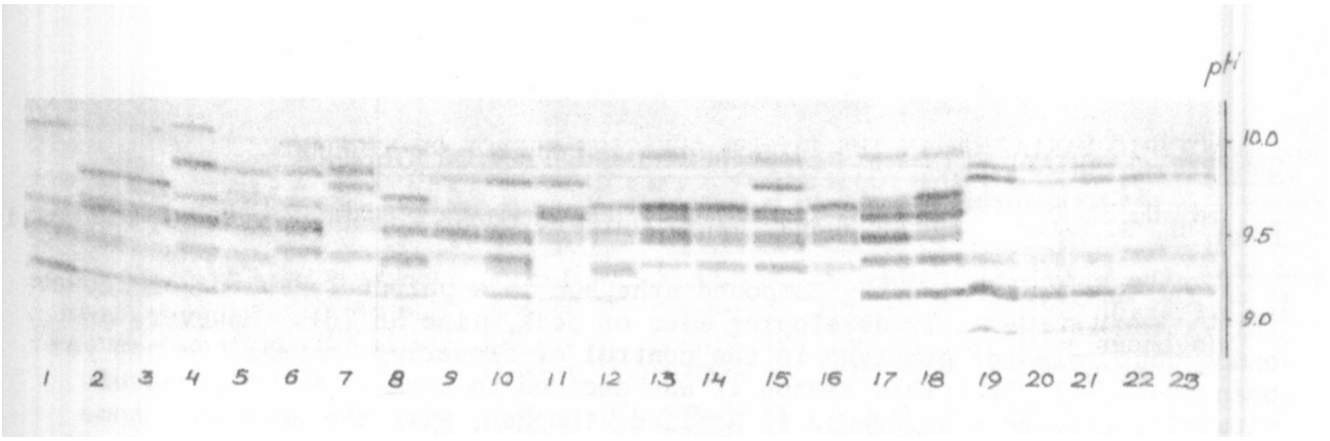

Fig. 1. Electropherogram illustrating the revealed variation in IEF spectrum of basic legumin components in Pisum. IEF spectra of the following lines are shown:
1-4 P. elatius, Gat. 255, W 226, W 805, W 1447;
5-7 -- P. humile, W 936, JI 241, JI 261;
8-16— P. sativum, W 110, W 806, W 807, W 1640, W 1833, W 1896, W 1913, W 1932, W 1958;
17-18— P. abyssinicum, W 808, VIR 2759;
19-23— P. fulvum, W 1256, JI 224a (dark brown testa), JI 224b (light brown testa), Vir 3397, and line from the Hebrew University of Jerusalem.

1. Przybylska, J., S. Blixt, J. Hurich, and Z. Zimniak-Przybylska. 1977. Genetica Polonica 18:27-38.
2. Przybylska, J., J. Hurich, and Z. Zimniak-Przybylska. 1979. Genetica Polonica 20:517-528.

This work was performed under the Government Project PR-4 (Poland)