INHERITANCE PATTERNS OF SOLUBLE SEED PROTEINS AND ESTERASE ISOZYMES IN PEA SEGREGANTS WITH DIFFERENT COLORED COTYLEDONS

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The purpose of this study was to investigate the mode of inheritance of some soluble proteins and esterase isozymes in F_2 segregants from a cross between parents having normal yellow vs. orange cotyledons. Five different F2 color classes were examined: brick, orange, light orange, dark yellow, yellow. The material was kindly provided by Dr. W. K. Swiecicki, Poznan, Poland.

Given the limited amounts of seed material available only small tissue sections of dry cotyledons were used in order to maintain the viability of the seeds. A quarter of one cotyledon of each genotype was directly extracted on agarose gel during isoelectric focusing. During this time (20 min) a physiologically conditioned leakage of seed proteins occurs which follows the same pattern in all seeds analyzed so far and which is independent of morphologicai and biochemical differences of the seeds. The proteins released from the cotyledonary tissue are suitable for studying genotypical differences on the basis of the isoelectric points (IEP) of the respective proteins. The banding patterns of the proteins are obtained by direct staining of the gels. They are distinct and reproducible.

The results for the soluble proteins are shown in Fig. 1.

The seed protein phenotypes identified after isoelectric focusing showed distinct and clear differences between the parental seed proteins. Therefore, it was possible to follow the inheritance of some proteins with different IEP's as indicated by the arrows. Some proteins were expressed fully in the segregants, others only faintly or were even lacking, as indicated by the staining intensities. Similar results were obtained with regard to the non-specific esterases, as shown in Fig. 2.

The esterase bands can be appointed to four zones within the zymograms. Considering the fact that the isozyme technique satisfies the criteria tor genetic markers better than any other method, the peculiar mode of esterse segregation is noteworthy. However, further experimental work is required, mainly with regard to the expression of the alleles responsible for the isozymes which ranges from full and half to null expression, as evaluated by their staining intensities.

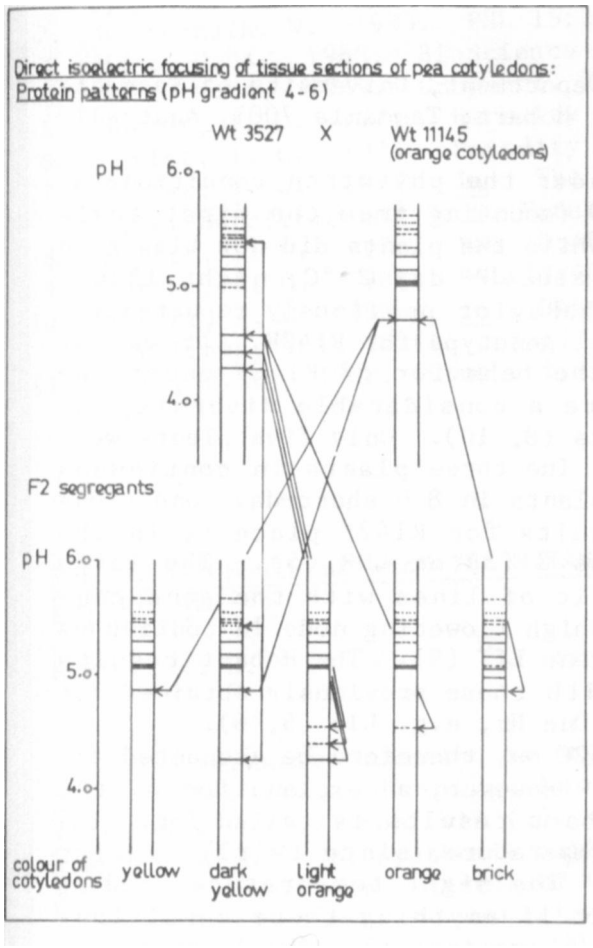

Fig. 1. Protein patterns of parental seed proteins and their segregants.

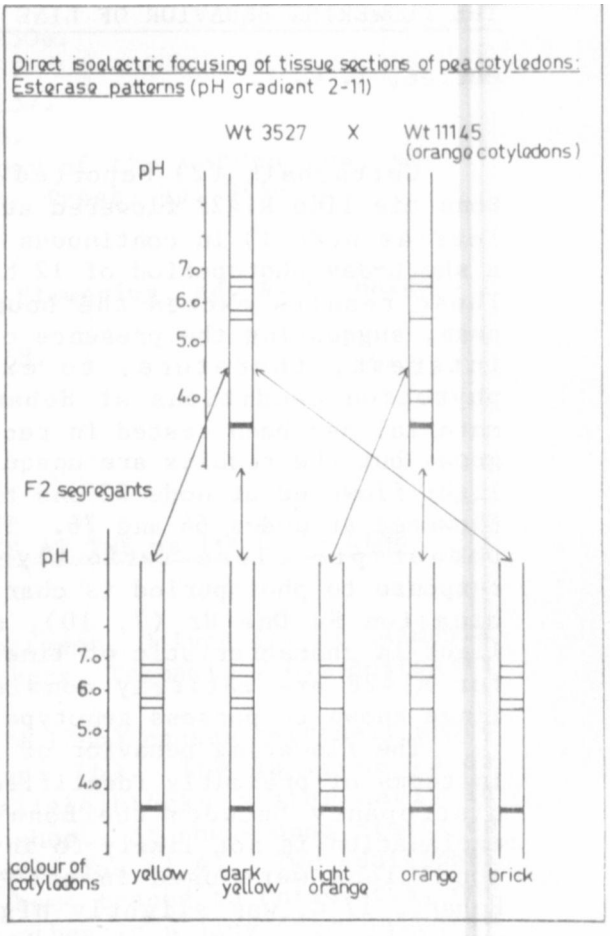

Fig. 2. Esterase patterns of parental seed proteins and their F_2 segregants