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SHORT COMMUNICATION

ACID PHOSPHATASE ISOZYMES IN HAPLOIDS AND SELFS OF GROUP TUBEROSUM POTATO CULTIVARS*

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Abstract—Acid phosphatase isoenzymes were compared from 185 haploids ($2n = 24$) and 201 selfs ($2n = 48$) of four parental potato cultivars in Group Tuberosum. Either one or two isoenzymes were detected in each potato tuber extract by acid gel disc electrophoresis with α-naphthyl phosphate as substrate. The two acid phosphatase isoenzymes appear to be controlled by independent genes. The presence of a suppressor gene for one of the isoenzymes is postulated.

Solanum species have been identified by acid gel disc electrophoresis of proteins from tuber extracts.[1] The interspecific analyses in potatoes revealed fourteen protein bands which occurred in various species-specific frequences. This method of analysis was also used to compare tuber extracts of 46 cultivars and 350 haploids and selfs from four parents.[2] A similar number of bands (12–14) were detected in these analyses. It was noted that the frequency of specific protein bands was higher in some haploids than in selfs from the same parent. In addition, some haploids had bands not present in their parent. It was speculated that suppressor genes in the tetraploid parent and selfs prevented the production of these proteins, while segregation of suppressor genes occurred in the haploids to allow production of these proteins.

The identity of these protein bands is of interest since if they are enzymes or isoenzymes they may prove to be useful biochemical gene markers. This report is concerned with two such bands from potato tubers which have been shown to be acid phosphatase isoenzymes. Two acid phosphatase isoenzymes have been reported in pinto bean leaves[3] and several forms occur in other plant sources.[4,5]

Many haploids and selfs from Ag 231, Chippewa, Katadin and Merrimack were analysed for the presence of acid phosphatase isoenzymes Ac 5 and Ac 6 (Table 1). Isoenzyme Ac 5 was detected in all samples.

The isoenzyme Ac 6 was absent in each parental cultivar, but frequently present in the haploids and selfs. This suggests that a single dominant suppressor gene for Ac 6 is segregating out in the haploid and self progenies. This hypothesis is supported by the fact that

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TABLE 1. DISTRIBUTION AND FREQUENCY OF ACID PHOSPHATASE ISOENZYMES IN FOUR GROUP TUBEROSUM PARENTS,* HAPLOIDS AND SELFS

			Frequency	
		Total samples	Band Ac 5	Band Ac 6
Ag 231	parent	6	100	0
	haploids	109	100	23·0
	selfs	100	100	0
Chippewa	parent	7	100	0
	haploids	27	100	22·2
	selfs	28	100	10·7
Katahdin	parent	4	100	0
	haploids	23	100	82·6
	selfs	36	100	50·0
Merrimack	parent	6	100	0
	haploids	26	100	0
	selfs	37	100	13·5

* Samples are clones grown in different field locations.

the isoenzyme Ac 6 is more frequent in the haploids of Ag 231, Chippewa and Katadin, than in selfs. However, for Merrimack it is more frequent in the selfs than in the haploids. The data from the Merrimack haploids and selfs indicate that perhaps the genetic control of the isoenzyme Ac 6 is different than in the other three cultivars. The parentage of Merrimack needs to be examined in light of these data.

The results suggest that the two isoenzymes are controlled by independent genes in Group Tuberosum cultivars.

EXPERIMENTAL

0·01–0·02 ml of tuber extracts were subjected to electrophoresis through 7·5% acid gel, as described previously,[2] and incubated in a mixture of 40 mg diazo blue B and 40 mg α-naphthyl phosphate in 40 ml 0·2 M sodium acetate buffer, pH 5·1. Bright red bands indicated the activity of acid phosphatase isoenzymes.