POLYMORPHIC ISOZYME LOCI IDENTIFIED IN PISUM

Weeden, N. F. NYS Agricultural Experiment Station
Geneva, NY 14456 USA

Scandalios and Espiritu (8) first identified polymorphism in pea aminopeptidases in 1969 and demonstrated that this polymorphism was produced by allelic variants at two independent loci. Since that time over 60 additional allozyme polymorphisms have been reported in Pisum, exposing genetic variation at 50 or more structural genes. Table 1 lists the polymorphic isozyme loci for which the allelic nature of the polymorphism has been demonstrated by segregation in F2 progenies. Not all of the supporting data have been published in PNL or other journals. However, appropriate segregation data will be forthcoming once the approximate chromosomal location of the respective locus has been determined. When more than one locus designation has been published in the literature, priority generally has been given to the term used with the first published segregation data. Exceptions include (1) the leucine aminopeptidase loci first published as Amp-1 and Amp-2 (reference 8) but which have become more commonly referred to as Lap-1 and Lap-2, (2) cases where synonoray probably exists but has yet to be confirmed (e.g. Amy), and (3) cases in which the original designation has been modified by the initial investigator(s) (e.g. Pgd-p). Additional work is still required on amylases and esterases to resolve questions of synonoray, particularly for Amy and Es.

Table 1. Isozyme loci defined in Pisum

Enzyme system	Locus	Chromosomal location	References
Acid phosphatase	Acp-1	5	15, 17
(alpha)	Acp-2	7	15, 17
	Ac.p-3	3	15, 17
(beta)	Acp-5		unpublished
Alanine aminotransferase	Alat-c	1	unpublished
	Alat-p	7[a]	12
Alcohol dehydrogenase	Adh-1	3	19
Aldolase	Aldo	2	14, 17
AminopeptIdase	Amp-1,2	—	8
(see leucine aminopeptidase)			
Amylase	Amy (synonomy unknown)		4
	Amy-1	2	6, 7, 18
	Amy-2		6, 7, 22
Aspartate aminotransferase	Aat-c	3	18
	Aat-m	2	17
	Aat-mb		unpublished
	Aat-p	1	9, 14, 18
Diaphorase	Dia-1	3	21
	Dia-3		21
Esterase	Es		2
	Est	4	3, 4
	Est-1	2	18
	Est-2	2	18
	Est-3	1	18
	Est-4	7[b]	18
Fructokinase	Fk	7[b]	unpublished

Fumarase	Fum		2[c]	unpubli shed
Galactosidase (beta)	Gal-1		—	11
	Gal-2		2	11
	Gal-3		3	11
Glutamate oxalacetate transaminase	Got-1	(synonomous with Aat-p)		4, 6
Glucosephosphate isomera.se	Gpi-c		—	unpublished
Isocitrate dehydrogenase	Idh		1	16, 17
Leucine aminotransferase	Lap-1		3	1, 8
	Lap-2		3	6, 8, 17, 21
Malate dehydrogenase	Mdh		1	5
Marmosephosphate isomerase	Mpi		5	18
N-acetyl-glucoaminidase	Nag		5	18
Peptidase	Pep-3		7[b]	18
	Pep-4		7[b]	unpublished
Peroxidase	Px-1		5	18
	Px-2		5	unpublished
	Px-3		2[e]	unpublished
	Px-4		2[e]	unpublished
Phosphogluocomutase	Pgm-c	(=Pgm-l)	7[b]	18
	Pgm-p	(-Pgm-2)	2	14, 17
6-phosphogluconate dehydrogenase	Pgd-c	(=6pgd-2)	5	10, 17
	Pgd-p	(=6pgd-l)	7[b]	iO, 18
Superoxide dismutase	Sod		2	unpublished
Shikimate dehydrogenase	Skdh		2	14, 17
Triosephosphate isomerase	Tpi-p		4	13

a - Linked to Wsp. There is some debate as to whether Wsp belongs on 1inkage group 7.
b - Linked to Rrn-2, believed to be the nucleolar organizer region on chromosome 7. However none of the more traditional chromosome 7 markers (R, Tl, Bt, Wsp) exhibit linkage to Rrn-2.
c - Tentative assignment.

In order to complete this summary of isozymes in pea, a second table has been prepared (Table 2). This table contains isozyme variation which has yet to be confirmed as allelic polymorphism.

Table 2. Isozyme variation not yet shown to be allelic in nature

Enzyme system	Line containing variant
Acid phosphatase-4)	1913
Fructose bisphosphatase	PI 353615
Glucose 6-phosphate dehydrogenase	PI 3586 12
Glutamate dehydrogenase	PI 2539 70
Malic enzyme	PI 358612
Phosphoenolpyruvate	PI 343972
Phosphoglycerate kinase	PI 358612
Transketolase	PI 143483

Line 1913 was obtained from the Nordiska Genbanken, Sweden. The remaining lines were isolated from the USDA Plant Introduction accession identified.

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