AN INDUCED LEAF DIFFERENTIATION MUTANT IN *SESAMUM INDICUM* L.

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DEVELOPMENTAL mutants affecting laminar grow are of interest as they influence the plant form an growth rate[1,2] and may involve only a sma number of genetic substitutions[3]. In addition to the use in the genetic manipulation of plant architectu amenable for combine harvest and improved yie at higher densities reported in various crop plant the modified leaf types are valuable for basic studi on source-sink relationships, relative distribution assimilates between vegetative and reproducti parts[2] and the evolution of leaf form in relation t distinct adaptive differences as in some geographic forms of *Sesamum*[4].

In a mutation breeding programme on *Sesamu* for resistance to charcoal rot using locally adapte cultivars in Venezuela, a narrow lamina mutati with only vestiges of lamina around the veins wa detected in 1985 in a progeny in the M 4 generati of a variety Ven-52. The material was derived fro an initial seed treatment of a dose of 60 kr of radiation from a ^{60}Co source. The secondary an tertiary veins of the lamina were disorganized growth similar to the leaf mutants in cotton reporte by Dilday *et al*[5]. The number and the size capsules and seed size in the mutant wer comparable to its normal counterpart. Howeve seed set in crosses with the mutant as female wa low. This mutant is of practical interest as chemica defoliants and dessicants are sprayed on the cro before harvest for easy mechanical harvest to ge seeds free from tiny leaf bits. This mutant can reduc the cost of such a treatment. The genetics of th character was analysed in the subsequent generation and reported in this paper.

The selfed progeny Ven 52-4-N_4-H_{32} in the M generation segregated with 236 plants with norma lamina and 22 with narrow lamina, χ^2 (1df) for 15: being 2.8539 (P 0.05–0.10) indicating that the mutant genotype is duplicate-recessive. To confirm the segregation pattern, the next generation was examined with the selfed progenies of 44 randomly selected normals and 33 narrow lamina segregants (table 1) and six crosses, including reciprocals between

Table 1 *Segregation for narrow leaf in selfed progenies in Sesamum*

Group segregation ratio	No. of progenies	No. of segregants: Normal lamina	Narrow lamina	Total	χ^2 1 df	P	χ^2 (heterogeneity)	P
A (15:1)	15	1339	85	1424	0.2394	0.50–0.75	12.4980 (14 df)	0.50–0.75
B (3:1)	12	486	159	645	0.0419	0.75–0.90	8.5884 (11 df)	0.50–0.75
C (all normal)	17	1160	0	1160				
	44	2985	244	3229				
D (all narrow lamina)	33	0	1820	1820				

Table 2 *Segregation for narrow leaf in crosses between sibs in Sesamum*

Cross	No. of segregants: Normal lamina	Narrow lamina	Total	Segregation pattern	χ^2 (1 df)	P	Genotypes of cross
8674 Normal × narrow	27	5	32	3:1	1.5000	(0.20–0.50)	$L_{n_1}l_{n_1}L_{n_2}l_{n_2} \times l_{n_1}l_{n_1}l_{n_2}l_{n_2}$
8676 Narrow × normal	28	12	40	3:1	0.5333	(0.30–0.50)	$l_{n_1}l_{n_1}l_{n_2}l_{n_2} \times L_{n_1}l_{n_1}L_{n_2}l_{n_2}$
8677 Narrow × normal	16	5	21	3:1	0.0159	(0.70–0.90)	$l_{n_1}l_{n_1}l_{n_2}l_{n_2} \times L_{n_1}l_{n_1}L_{n_2}l_{n_2}$
	71	22	93	3:1	0.0896	(0.75–0.90)	
				χ^2 heterogeneity (2 df) = 1.9596 (P, 0.25–0.50)			
8675 Narrow × normal	23	18	41	1:1	0.6090	(0.30–0.50)	$l_{n_1}l_{n_1}l_{n_2}l_{n_2} \times L_{n_1}l_{n_1}l_{n_2}l_{n_2}$
8678 Narrow × normal	46	0	46	(1:0)			$l_{n_1}l_{n_1}l_{n_2}l_{n_2} \times L_{n_1}L_{n_1}L_{n_2}L_{n_2}$
8679 Narrow × narrow	0	25	25	(0:1)			$l_{n_1}l_{n_1}l_{n_2}l_{n_2} \times l_{n_1}l_{n_1}l_{n_2}l_{n_2}$

normal and narrow lamina sibs and one cross between two narrow lamina sibs (table 2). Standard χ^2 analysis was used to test for deviations from the expected segregation ratios for heterogeneity.

Assuming duplicate recessive control for the mutant phenotype, the pattern of segregation of the 44 random progenies, the observed and expected distribution of the groups, segregating for normal vs narrow lamina in the ratios of 15:1 (A) and 3:1 (B) and the non-segregating (C) classes revealed good fit and homogeneity within each group. All the 33 progenies of narrow lamina segregants (D) bred true for the same as expected. The relative proportion of the 44 progenies of groups A, B and C was as expected in the ratio of 4:4:7 under duplicate recessive control of narrow leaf (χ^2 2df = 1.0556; P 0.50–0.75).

The segregation in the crosses between narrow lamina and normal sibs revealed no reciprocal differences and confirmed that the abnormal leaf mutant is homozygous-recessive for two loci. The normal phenotype could be homozygous dominant or heterozygous for one or both the loci. The two loci are designated as L_{n_1}–l_{n_1} and L_{n_2}–l_{n_2}.

The vascular system in the lamina of the mutant was poor with only 1–2 vascular bundles/microscopic field (× 900) compared to 8–10 in the normal plants. This effect was not evident in the vascular system of the main stem, branches or the inflorescence indicating a localized pleitropic effect on the leaf only. The incorporation of the narrow lamina alleles into the genetic background of superior yielding phenotypes could be useful for improved higher harvest index and for basic physiological studies.

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