AN INDUCED LEAF DIFFERENTIATION MUTANT IN SESAMUM INDICUM L.

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Developmental mutants affecting laminar growth are of interest as they influence the plant form and growth rate\(^1,2\) and may involve only a small number of genetic substitutions\(^3\). In addition to their use in the genetic manipulation of plant architecture, amenable for combine harvest and improved yield at higher densities reported in various crop plants, the modified leaf types are valuable for basic studies on source-sink relationships, relative distribution of assimilates between vegetative and reproductive parts\(^2\) and the evolution of leaf form in relation to distinct adaptive differences as in some geographical forms of Sesamum\(^4\).

In a mutation breeding programme on Sesamum for resistance to charcoal rot using locally adapted cultivars in Venezuela, a narrow lamina mutant with only vestiges of lamina around the veins was detected in 1985 in a progeny in the M4 generation of a variety Ven-52. The material was derived from an initial seed treatment of a dose of 60 kr of radiation from a \(^{60}\text{Co}\) source. The secondary and tertiary veins of the lamina were disorganized as growth similar to the leaf mutants in cotton reported by Dilday \textit{et al}\(^5\). The number and the size of capsules and seed size in the mutant was comparable to its normal counterpart. However, seed set in crosses with the mutant as female was low. This mutant is of practical interest as chemical defoliants and desiccants are sprayed on the crop before harvest for easy mechanical harvest to get seeds free from tiny leaf bits. This mutant can reduce the cost of such a treatment. The genetics of this character was analysed in the subsequent generations and reported in this paper.

The selfed progeny Ven 52-4-N\(_4\)-H\(_{32}\) in the M4 generation segregated with 236 plants with normal lamina and 22 with narrow lamina, \(\chi^2\) (1df) for 15:1 being 2.8539 (\(P > 0.05\)) 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...
normal and narrow lamina sibs and one cross between two narrow lamina sibs (Table 2). Standard $\chi^2$ 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 ($\chi^2$ 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 $l_{n1}$, $l_{n2}$ and $l_{n3}$.

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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