

GIRNAR 1 nlm — A NEW NARROW LEAF MUTANT OF GROUNDNUT

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In groundnut (*Arachis hypogaea* L.) available variability for simple inheritance in the germplasm pool is very much limited. Induced mutations are considered to be an alternative/supplement to hybridization for generating variability in groundnut, particularly canopy development and pod number, without altering the agronomic traits of the cultivars under study [1, 2]. Such diversified genetic variability could be valuable as useful germplasm. By the treatment with mutagens, recessive mutations are often realized in M_2 and subsequent generations [3]. Certain alkylating agents such as diethyl sulphonate (DES) and ethyl methane sulphonate (EMS) have often been used for producing mutants in groundnut [2]. We are reporting a new narrow leaf mutant of groundnut developed through chemical mutagenesis.

The dry and uniform sized seeds of the Spanish bunch groundnut cultivar-Girnar 1 (*Arachis hypogaea* ssp. *fastigiata* var. *vulgaris*) were pre-soaked in distilled water for 12 hours and then were treated to the different concentrations of DES and EMS, the pre-soaked seeds were soaked in individual mutagenic solution in sequence of four hours each. Treated seeds were washed thoroughly in running water and sown immediately in the field alongwith the control at National Research Centre for Groundnut, Junagadh (Gujarat) during kharif 1994 and summer 1995. In the present study, the LD_{50} for DES could be between 0.1 to 0.2%, whereas for EMS it might be more that 0.2%. The M_1 and succeeding generations were handled in usual progeny row method.

In the M_2 generation, certain plants were isolated which distinctly characterized by (a) small, narrow and pointed leaflets (Plate 1), (b) dwarf in height with shorter internodes and more branching, and (c) shift to Virginia bunch growth habit (*Arachis hypogaea* ssp. *hypogaea* var. *hypogaea*) conspicuous by alternate branching pattern and absence of main axis flowering with early maturity (Table 2). Out of 86945 plants screened in M_2 generation the frequency of this mutant ranged from 0.13% to 1.03% with an overall mean frequency of 0.18% (Table 1). The narrow leaflet character was

Table 1. Treatments and frequency of Girnar 1 nlm mutant in M₂ generation in groundnut

Mutagen treatment	Number of mutants	Plant population	Frequency of the mutant (%)
DES 0.01%	13	2983	0.44
DES 0.02%	36	3510	1.03
DES 0.05%	25	6742	0.37
DES 0.10%	-	6779	-
DES 0.20%	-	654	-
EMS 0.01%	-	2861	-
EMS 0.02%	-	2842	-
EMS 0.04%	10	2085	0.48
EMS 0.05%	-	5771	-
EMS 0.10%	-	6060	-
EMS 0.20%	-	6642	-
DES 0.01% + EMS 0.01%	-	1564	-
DES 0.01% + EMS 0.02%	-	2161	-
DES 0.01% + EMS 0.04%	14	2460	0.57
DES 0.02% + EMS 0.01%	-	2004	-
DES 0.02% + EMS 0.02%	4	2507	0.16
DES 0.02% + EMS 0.04%	-	2155	-
DES 0.05% + EMS 0.05%	-	6115	-
DES 0.05% + EMS 0.10%	-	6533	-
DES 0.10% + EMS 0.05%	49	6262	0.78
DES 0.10% + EMS 0.10%	9	6994	0.13
Frequency over whole M ₂ population	159	86945	0.18

manifested at fifth or sixth leaf stage of initial growth as reported in TMV 2 NLM mutant [2]. This mutant bred true in subsequent M₃ and M₄ generations and was designated as Girnar 1 nlm.

Table 2. Salient features of the Girnar 1 nlm mutant and its parent Girnar 1

Salient characteristics	Girnar 1 nlm	Girnar 1
Height of main axis (cm)	9.30	15.30
Maximum branch height (cm)	10.90	20.30
Number of primary branches	4.00	4.07
Number of secondary branches	7.00	1.30
Number of nodes on main axis	9.90	9.90
Number of leaves per plant	80.00	43.00
Internodal length (cm)	0.94	1.55
Leaflet length (cm)	2.00	3.50
Leaflet width (cm)	0.73	1.70
Petiole length (cm)	2.20	4.40
Specific leaf area (cm)	53.18	96.38
Days to maturity (days)	90	100
Number of pods per plant	7.00	15.33
Number of seeds per plant	10.13	28.47
Pod length (cm)	1.20	3.20
Pod weight per plant (g)	2.86	10.39
Seed weight per plant (g)	1.77	6.05
100-seeds mass (g)	20.00	29.00
Shelling outturn (%)	64.00	68.00

The Girnar 1 nlm was crossed with its parent Girnar 1 during kharif 1996. The F₁ and F₂ generations along with parent were evaluated during kharif 1997 and 1998, respectively. In F₁ generation, all plants were alike to Girnar 1. In F₂ generation the plants with normal leaf were 189 and same with narrow leaf were 66 in numbers which satisfied the segregation ratio of 3 normal : 1 narrow leaf (χ^2 value = 0.11 with p value ranging between 0.7 and 0.8). This indicated that the narrow leaf character reported herein was governed by a single recessive gene. The genotypic configuration of plants for this character could be 1^N 1^N (normal leaf) and 1ⁿ 1ⁿ (narrow leaf). Tiwari and Khanorkar [3] also reported miniature plant type with small leaf character in groundnut governed by single recessive gene.

In view of its low specific leaf area (SLA), dwarf plant type, desirable pattern of earliness in virginia types and better resistance to rust (*Puccinia arachidis*), the Gimar 1 narrow leaf mutant could form a useful breeding material considering the narrow genetic base of the groundnut breeding programme.

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