ICGL 1, ICGL 2, ICGL 3, ICGL 4, and ICGL 5 Nonnodulating Groundnut Germplasm Lines

- **Useful for studies on nitrogen fixation, and uptake in groundnut**
- **Derived from crosses between nodulating groundnut genotypes**
- **ICGL 1, ICGL 2, ICGL 3, and ICGL 5 belong to subsp. *fastigiata***
- **ICGL 4 belongs to subsp. *hypogaea***
- **Low in protein (10-14%)**
- **ICGL 1, ICGL 3, and ICGL 5 have high oil contents (52-53%)**

ICRISAT

Plant Material Description no. 34

International Crops Research Institute for the Semi-Arid Tropics
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Purpose of Description

ICGL 1, ICGL 2, ICGL 3, ICGL 4, and ICGL 5 are nonnodulating groundnut lines that are potentially useful for studies related to nitrogen fixation and its uptake in groundnut.

Origin and Development

ICGL 1, ICGL 2, ICGL 3, and ICGL 4 originate from nonnodulating single-plant selections made in the F_2 generation of a cross between nodulating groundnut genotypes NC 17 and PI 259747. ICGL 5 originates from a cross between Shantung KU No 203 and PI 259747. These single-plant selections were progeny rowed, following the pedigree method, for several generations until morphologically uniform nonnodulating lines were established.

Genetics of Nonnodulation

The genetics of nonnodulation involving different crosses has been extensively studied. These studies indicate that nonnodulation in groundnut is governed by a single recessive gene (Dashiell and Gorbet, 1982), duplicate recessive genes (Dashiell and Gorbet, 1982; Nigam et al. 1980 and 1982), and a trigenic model with two genes expressing the nodulation and a third gene inhibiting nodulation when it is in a dominant condition and the former two genes are in recessive homozygous conditions (Dutta and Reddy, 1988). Nonnodulating lines originating from NC 17 x PI 259747 and Shantung KU No 203 x PI 259747 crosses did not show allelic differences for nonnodulation (Branch et al. 1984).

Performance

These nonnodulating lines produce only a few pods in the absence of fertilizer-N. Even if they receive 200 kg fertilizer-N ha^{-1} in split doses, they do not produce pod yields comparable to those of nodulating genotypes (Table 1).

Table 1. Effect of fertilizer-N on haulm and seed yields of nodulating and nonnodulating groundnut genotypes.

	Haulm yield (t ha^{-1})			Seed yield (t ha^{-1})		
Nitrogen applied (kg ha^{-1})	Non-nodulating line	Robut 33-1	J 11	Non-nodulating line	Robut 33-1	J 11
0	1.10	4.79	3.83	0.57	2.58	2.85
50	1.73	4.77	4.42	0.86	2.49	2.47
100	2.24	4.82	4.03	0.95	2.94	2.15
150	3.41	4.39	4.81	1.30	2.81	2.09
250	2.97	5.65	5.24	1.20	2.59	2.30
SE		±0.291			±0.222	

Source: Nambiar et al. 1986.

Plant Characters

ICGL 1, ICGL 2, ICGL 3, and ICGL 5 belong to the sequential branching group (subsps. *fastigiata),* and ICGL 4 to the alternate branching group (subsps. *hypogaea).*

ICGL 1, ICGL 4, and ICGL 5 have erect growth habits, and flowers with orange standard, and yellow wing petals. ICGL 2 has a decumbent 3 to erect growth habit, and flowers with tangerine-orange standard and wing petals. ICGL 3 has an erect growth habit and its flower color is similar to that of ICGL 2. The number of primary and secondary branches are similar in ICGL 1, ICGL 2, and ICGL 3. ICGL 4 has more secondary branches than ICGL 1, ICGL 2, and ICGL 3. ICGL 5 has fewer secondary branches than ICGL 1, ICGL 2, and ICGL 3.

Pod/Seed Characters

ICGL 1 has 2-3-1 seeded, thick-shelled, prominently reticulated pods with none to slight constrictions, and no beaks. Its seeds have tan testas, and a 100-seed mass of 41 g. They contain on average 52% oil and 13% protein.

ICGL 2 has 2-3-4-1 seeded, slightly to moderately constricted pods with moderate to prominent beaks and reticulation. Its seeds have purple testas, and a 100-seed mass of 33 g. They contain 49% oil and 10% protein.

ICGL 3 has 2-3-1 seeded, slightly to moderately constricted pods with moderate to prominent beaks and reticulation. Its seeds have purple testas and a 100-seed mass of 41 g. They contain 53% oil and 10% protein.

ICGL 4 has 3-2-4-1 seeded, slightly reticulated pods, with slight to moderate constrictions and beaks. The seeds have tan testas, a 100-seed mass of 33 g, and contain 46% oil and 11% protein.

ICGL 5 has 2-1-3 seeded, small, moderately reticulated pods, with constrictions and none to slight beaks. Its seeds have tan testas, a 100-seed mass of 40 g, and contain 53% oil and 14% protein.

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Plant Material Descriptions from ICRISAT

Leaflets in this series provide brief descriptions of crop genotypes identified or developed by ICRISAT, including:

- germplasm accessions with important agronomic or resistance attributes;
- breeding materials, both segregating and stabilized, with unique character combinations; and
- cultivars that have been released for cultivation.

These descriptions announce the availability of plant material, primarily for the benefit of the Institute's cooperators. Their purpose is to facilitate the identification of cultivars and lines and promote their wide utilization. Requests should be addressed to the Director General, ICRISAT, or to appropriate seed suppliers. Stocks for research use issued by ICRISAT are sent to cooperators and other users free of charge.

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