29503. Recipients of seed are asked to make appropriate acknowledgment of the source of the germplasm if it is used in the development of new germplasm, cultivars, or hybrids.

C.C. GREEN,* T.W. CULP, AND B.U. KITTRELL (4)

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## REGISTRATION OF EMBRYOGEN-P ORCHARDGRASS GERMPLASM WITH A HIGH CAPACITY FOR SOMATIC EMBRYOGENESIS FROM IN VITRO CULTURES

EMBRYOGEN-P orchardgrass (*Dactylis glomerata* L.) germplasm (Reg. no. GP-2, PI 543748) was released by the Tennessee Agricultural Experiment Station in April 1990.

Embryogen-P was derived from the cultivar 'Potomac' (8) by screening >100 plants for plant regeneration from leaf segments cultured in vitro on Shenk and Hildebrandt (6) medium containing 30 $\mu M$ dicamba (3,6-dichloro-2-methoxybenzoic acid). Two embryos were found on a callus derived from a leaf segment of one plant. The embryos were germinated and the resulting seedlings established as plants. When leaves from these plants were cultured in vitro, a very high capacity for somatic embryogenesis was observed (1,4). The embryogenic response was maintained with additional in vitro culture cycles (5). The response is highly genotype dependent and appears to be controlled by one or a few dominant nuclear genes (2).

The main value and use of Embryogen-P will be as an experimental laboratory organism. In addition to producing somatic embryos directly from mesophyll cells (1) and anthers and pistils (7), embryos can also be produced to a fully developed (germinable) stage in a single liquid medium (3). These cell and tissue culture systems are unique among Gramineae, and provide novel research opportunities in plant development and biotechnology.

Plants of Embryogen-P are phenotypically normal in color and morphology. They are fertile and can be used in crosses with other genotypes. Limited cytological studies have revealed no chromosome abnormalities. Plants established in the field, especially those from third or fourth regeneration cycles, appear to be slightly less stress tolerant (e.g., less drought and winter hardiness) compared with seed-grown plants of Potomac.

Embryogen-P is maintained by the Department of Plant and Soil Science, University of Tennessee Agricultural Experiment Station. Requests for it will be honored by supplying sterile cultures of leaf segments or live propagules from greenhouse plants. It is requested that users give appropriate acknowledgment when Embryogen-P contributes to the development of new germplasm or cultivars or publications resulting from laboratory experiments.

B. V. CONGER* AND G.E. HANNING (9)

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## REGISTRATION OF FIVE NONNODULATING PEANUT GERMPLASM LINES

FIVE NONNODULATING PEANUT (*Arachis hypogaea* L.) germplasm lines, 'ICGL 1' (Reg. no. GP-50, PI 544348), 'ICGL 2' (Reg. no. GP-51, PI 544349), 'ICGL 3' (Reg. no. GP-52, PI 544350), 'ICGL 4' (Reg. no. GP-53, PI 544351), and 'ICGL 5' (Reg. no. GP-54, PI 544352), were developed at the research center of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in India. They were subsequently released in 1989. The basis for release of these five lines is their nonnodulating trait, which may be useful in studies relating to $N_2$ fixation and uptake in peanut (3).

All of these nonnodulating peanut lines were derived from crosses between nodulating peanut genotypes that had been made for the foliar disease resistance breeding program. ICGL 1, ICGL 2, ICGL 3, and ICGL 4 trace their origin to nonnodulating single-plant selections made in the $F_2$ generation of a cross between 'NC 17' × PI 259747. ICGL 5 was derived from a cross between 'Shantung KU No. 203' × PI 259747. All these single-plant selections were made in 1978 in a field-grown, foliar disease screening nursery at ICRISAT Center, Patancheru, India. These single-plant selections were progeny-rowed for several generations until morphologically uniform nonnodulating lines were established. These stable nonnodulating lines were evaluated for various traits in the 1987 rainy season at ICRISAT Center (2).

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

ICGL 1 has erect growth habit and flowers with orange-colored standard and yellow wing petals. Its main axis is 40 cm high, with a canopy width of 30 cm. It has 2-3-1 seeded thick-shelled, prominently reticulated pods with none to slight constriction, and no beak. It has tan colored seeds with 100-seed mass of 41 g. Oil and protein content average 52% and 13%, respectively.

ICGL 2 has decumbent-3 to erect growth habit and tangerine orange-color standard and wing petals in flowers. Secondary branches are few. It has a main axis of 36 cm height with a canopy breadth of 32 cm. It has 2-3-4-1 seeded slightly to moderately constricted pods with moderate to prominent beak and reticulation. Its purple colored seeds with 100-seed mass of 33 g contain 49% oil and 10% protein.

ICGL 3 has erect growth habit, and flower color similar to that of ICGL 2. The height of the main axis and canopy breadth are 44 cm and 39 cm, respectively. It has 2-3-1 seeded slightly to moderately constricted pods with moderate to prominent beak and reticulation. Its purple colored seeds have 100-seed mass of 41 g. They contain 53% oil and 10% protein.

ICGL 4 has erect growth habit and flowers with orange-colored standard and yellow wing petals. Secondary branches are many. It has a main axis of 34 cm height, with a canopy breadth of 44 cm. It has 3-2-4-1 seeded slightly reticulated pods with slight to moderate constriction and beak. Its tan colored seeds contain 46% oil and 11% protein, with 100-seed mass of 33 g.

ICGL 5 has erect growth habit and flowers with orange-colored standard and yellow wing petals. It has a few secondary branches. Its height of main axis is 35 cm and breadth of canopy is 34 cm. It has 2-1-3 seeded small moderately reticulated pods, with constriction and beak being none to slight. Its tan colored seeds have a 100-seed mass of 40 g. They contain 53% oil and 14% protein.

These nonnodulating lines produce only a few pods in the absence of mineral N fertilization. Even after application of up to 200 kg N in split doses, they do not compare well for pod yield with nodulating genotypes (3).

The nonnodulation character in the cross NC 17 × PI 259747 is reported to be governed by duplicate recessive factors (4,5). Nonnodulating lines originating from NC 17 × PI 259747 and Shantung KU No. 203 × PI 259747 crosses showed no allelic differences for nonnodulation (1).

The Genetic Resources Unit, ICRISAT, Patancheru P.O., Andhra Pradesh 502 324, India, maintains breeder seed of these lines.

S.N. NIGAM, S.L. DWIVEDI,* P.T.C. NAMBIAR, AND R.W. GIBBONS (6)

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## REGISTRATION OF SOYBEAN GERMPLASM LINE S88-2036 HAVING MULTIPLE-RACE SOYBEAN CYST NEMATODE RESISTANCE

S88-2036, a soybean [*Glycine max.* (L.). Merr.] germplasm line (Reg. no. GP-124, PI 543795) with multiple-race resistance to soybean cyst nematode (SCN) (*Heterodera glycines* Ichinohe was released in March 1990 by the Missouri Agricultural Experiment Station for breeding and experimental purposes. S88-2036 derives its SCN resistance from PI 437654, a plant introduction reported to be resistant to Races 1 through 5 (Anand et al. 1988). In subsequent testing, we found PI 437654 to be resistant to all races and biotypes of SCN collected from all regions of the USA.

S88-2036 was developed at the Delta Center of the University of Missouri, Portageville, MO. A backcross method of breeding was used. The initial cross was made between PI 437654 and Forrest (2), a soybean cultivar resistant to Race 3. The $F_2$ plants were screened in the greenhouse against a gene pool of SCN races. The gene pool of SCN consisted of a mixture of Races 1, 2, 3, 4, 5, 6, 9, and 14, along with a few undefined SCN biotypes. These were collected from soybean fields in Missouri, Arkansas, Tennessee, North Carolina, Georgia, Florida, Iowa, and Ohio. Four $F_2$ plants found to be free of SCN were transplanted and were backcrossed to Forrest in the same year. The $F_2$ population derived from the backcross was evaluated similarly to the original $F_2$ population. Resistant plants were transplanted to the field and backcrossed again to Forrest. The $F_2$ population of Forrest[3] × PI 437654 was grown in a field that was highly infested with several races of SCN. Individual plants were harvested and progeny tested in the greenhouse for reaction to SCN. Five resistant $F_3$ lines were grown from $F_2$ plants having a maximum of two cysts per plant. From each $F_3$ line, 75 to 100 plants were harvested. The $F_4$ lines were evaluated for seed yield. Ten plants from each of the high-yielding lines were saved for SCN screening and the rest of the seed was increased in Puerto Rico. Selected progenies were yield tested in 1989 in replicated tests at three locations in southeast Missouri representing clay, loam, and sandy soils. Among these progenies, S88-2036 was selected for its superior performance and high level of resistance to SCN. It yielded as well as Forrest and Bedford on clay and loam soils and was significantly superior to these two cultivars on SCN-infested sandy soils. S88-2036 has determinate plant type and is in Maturity Group V, similar to Forrest. It has white flowers and tawny pubescence. It is slightly shorter in plant height and ≈2 d earlier than Forrest. The seeds are yellow, with black hila. Reaction to specific diseases or root-knot nematode have not been determined.

S. C. ANAND* (3)

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