Registration of LN-183, Nondormant *Cuphea lanceolata* Germplasm

LN-183 (Reg. no. GP-4, PI 574384) is a nondormant, open-pollinated population of *Cuphea lanceolata* Ait. LN-183 was developed from LN-148 after three cycles of recurrent mass selection for decreased seed dormancy. LN-183 was developed at Oregon State University and was officially released by the Oregon Agricultural Experiment Station in 1992. LN-148 was developed by intermating (LN-61-ND)S_5/(LN-68)S_5 F_1 plants.

Although wild populations of *C. lanceolata* exhibit some seed dormancy, the dormancy of this species is less severe than that of many other species of *Cuphea* (1,2,3). The postharvest seed dormancy of wildtype *C. lanceolata* germplasm ranges from 4 to 16 wk, while the embryo dormancy ranges from 1 to 8 wk (1,2). Seed of *C. lanceolata* can be germinated by removing the seed coats once embryo dormancy is broken. LN-183 lacks postharvest seed coat or embryo dormancy. The germination percentages of freshly harvested LN-183 seed usually exceed 80%. Other *C. lanceolata* lines and populations must be stored for a minimum of 4 wk before these germination percentages can be achieved (1,2,3). Many species of *Cuphea* need several months or years of storage before they germinate.

(LN-61-ND)S_5 is a nondormant inbred line of *C. lanceolata*. This line originated from the wild open-pollinated population LN-61. Freshly harvested seed of LN-61 did not germinate, but a random LN-61 S_3 line with no postharvest seed dormancy was observed and selected. Sublines of this line were developed and selected for two additional generations and culminated in the development of the nondormant inbred line (LN-61-ND)S_5. The vigor of (LN-61-ND)S_5 was severely depressed by inbreeding, and this line was unusually hard to propagate sexually. This problem was overcome by crossing it to a partially nondormant inbred line (LN-68)S_5 to restore vigor and create a narrow-based open-pollinated population LN-148. Three cycles of recurrent mass selection for nondormancy were subsequently completed within LN-148. The first 30 germinants among 600 seeds were selected each cycle; 100% of the selected progeny lacked postharvest seed dormancy. The open-pollinated population LN-183 was created by intermating the progeny from the last cycle of selection. LN-183 combines vigorous growth with a lack of postharvest seed dormancy.

LN-183 can be distinguished from undomesticated *C. lanceolata* germplasm by the lack of postharvest seed dormancy; however, the growth habit, seed shattering, and other traits of LN-183 are typical of undomesticated germplasm (4). The seed oil, caprylic, capric, lauric, myristic, palmitic, oleic, and linoleic acid contents of LN-183 harvested at Corvallis, OR, in 1991 were 285, 8, 836, 21, 21, 32, 29, and 46 g kg^{-1}, respectively. These percentages are typical of wildtype *C. lanceolata* germplasm (5). The 1000-seed weight of the 1991 harvest of LN-183 was 2.9 g. This germplasm is indeterminate with mature heights greater than 0.75 m and often exceeding 1.5 m. LN-183 is a source of germplasm for breeding nondormant germplasm and cultivars. Seed of LN-183 can be obtained by writing to the corresponding author. Please acknowledge the source of this germplasm when developing additional germplasm, cultivars, or hybrids.

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Registration of ICGS 35 Peanut Germplasm

ICGS 35 (ICGV 87127) (Reg. no. GP-67, PI 577819) spanish peanut (*Arachis hypogaea* L. subsp. *fastigiata* Waldron var. *vulgaris* Hartz) was developed at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, Andhra Pradesh, India. It was introduced into the Republic of Korea in 1981, together with other breeding lines from ICRISAT. After a 4-yr evaluation in multilocation trials, the Crop Experiment Station of the Rural Development Administration, Suweon, Korea, recommended its release under the name 'Jinpungtangkong' in 1986 for cultivation in the country (3).

ICGS 35 was developed following the bulk pedigree method from a single plant selected in 1977–1978 in a natural hybrid population of an Indian cultivar Robut 33-1 (also known as Kadiri 3) (4). In the progeny of the selected single plant, a single plant was selected. Phenotypically uniform plants were selected from the progeny of the latter plant and bulked. In subsequent nine generations of the bulk, the process of selection and bulking was repeated until the population was phenotypically stable. The pedigree of ICGS 35 is (Robut 33-1)-P_{24}-P_{16}-B_1-B_1-B_1-B_1-B_1-B_1-B_1-B_1-B_1-B_1.

ICGS 35 produced an average pod yield of 5.6 t ha^{-1} in the five postrainy (November–April) seasons (1979–1980 to 1983–1984) and 2.5 t ha^{-1} in the three rainy (June–October) seasons (1980, 1982, and 1983) at the ICRISAT Center. The average pod yield of ICGS 35 over eight seasons was 14% higher than that of the parent cultivar Robut 33-1 (2). In the Republic of Korea, ICGS 35 was tested against local cultivars in multilocational trials from 1982–1983 to 1986 (3). In these trials, it produced an average of 3.0 t seed ha^{-1}, which was 15–32% more than that of local cultivars Olatangkong, Yeonghotangkong, and Saedletangkong. It flowered 2 d later than Saedletangkong but 5 d earlier than Yeonghotangkong. Its average meat content in these trials was 71%.

ICGS 35 has an erect growth habit, sequential flowering, small- to medium-sized elliptic dark green leaves, and orange flowers (1). Its plant height (main axis) is 47 cm. It has 2-seeded pods with deep constriction. Its seeds are tan with a 100-seed mass of 44 g, and contain 530 g oil and 240 protein kg^{-1} dry seed.

ICGS 35 has a reaction to rust (caused by *Puccinia arachidis* Speg.), late leaf spot [caused by *Phaeoisariopsis personata* (Berk. & M.A. Curtis) Arx; syn. *Cercosporidium personatum* (Berk. & M.A. Curtis) Deighton], early leaf spot (caused by *Cercospora arachidicola* S. Hori), and phoma (web blotch) [caused by *Phoma arachidicola* Marasas, G.D. Pauer & Boerema] similar to that of the local cultivar Saedletangkong in Korea. It was scored 5 for rust and late leaf spot, 3 for early leaf spot, and 7 for phoma (web blotch) on a 0–9 scale, where 0 = no disease and 9 = highly susceptible.

The Genetic Resources Unit, ICRISAT Center, Patancheru, AP 502 324, India, maintains the breeder seed of ICGS 35.

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Registration of Five Lysine-Enhanced Rice Germplasm Lines: 2K41, 2K539, 2K(C193), 2K497, and 2K601

Five rice (*Oryza sativa* L.) (Reg. no. GP-73 to GP-77, PI 564784 to PI 564788) germplasm lines, enhanced for endosperm lysine, were developed by the USDA-ARS, Beltsville, MD, from callus cultures. Anther-derived cells from the cultivar Calrose 76 (1), subspecies *japonica*, were grown at inhibitory levels of lysine plus threonine (L+T) and cells insensitive to L+T inhibition were grown for another passage in the presence of another inhibitor, *S*-(2-aminoethyl) cysteine. This second inhibitor is a chemical analog of lysine. Plants were regenerated from callus insensitive to both sets of inhibitors and selected for stability in the transmission of enhanced lysine to offspring (2). All lines were either selfed, backcrossed, or crossed to 'M-101' (3), a marker line with smooth leaves conditioned by the glabrous (*gl*) gene. Lines were grown in the greenhouse in Beltsville, MD, and in the field in Arkansas, California, and Texas. These lines exhibit 3 to 15% greater lysine in the endosperm in materials allowed to self pollinate naturally for more than six generations. Enhanced lysine is inherited in a recessive manner (2). Genetic and environmental modifiers probably affect segregation, but components have not been identified. The enhanced lysine is linked to soft and chalky endosperm and is associated with elevated protein in some lines. Except for 2K601 described below, all of these lines have chalky endosperm. We are unable to test the inheritance for protein levels because most plants were partially infertile, rendering estimates unreliable. Protein estimates represent total amino acids from acid hydrolyzates of single half-seeds of brown rice. Some lines are more environmentally sensitive than Calrose 76 to temperature and other stress factors. Sensitivity is expressed in a range of fertilities when grown under nonadapted conditions.

Germplasm for enhanced lysine with vitreous seeds was also found in subspecies crosses, which segregated into characters with a wide range of values for plant height, seed size, maturity, chalkiness, and chemical composition. All lines recovered from inhibitor selections had chalky seed. Some plants displayed extensive hybrid vigor in plant height and seed size. These segregants have not been processed into advanced generations to the same degree as within-cultivar crosses from Calrose 76.

The germplasm was advanced in the greenhouse at Beltsville, MD through successive generations by selection of single plants with seed lysine levels $\geq$ 3.5% of total amino acids (10% enhancement) above parental seed. Analyses were done either on single half-seeds of brown rice or composite samples of 10 half-seeds from individual plants. Individual field plants grown as spaced plants or marked plants in small populations were handled similarly. Materials grown in 2.1-m rows were combined and sampled as a single 10-seed composite or sampled as individual half-seeds. Low-lysine samples judged to be unaltered segregants were discarded, and only samples with grain lysine $\geq$ 3.5% were advanced. The last generation represents a bulk value.

Infertility observed in the original plants recovered from tissue culture was expressed in varying degrees in all subsequent selfed material including S_7. Variation in seed set was probably influenced by location in the field and time of year in the greenhouse. At least six lines were field grown at one or more of three locations in 1989, 1990, and 1991. The mean fertility of seven lines grown in both California and Arkansas was 54%. The most fertile line, 2K41, was improved by backcrossing with Calrose 76 pollen. Progeny grown in Beltsville in 1992 were 90% fertile and the total seed weight from some individual plants was similar to Calrose 76 grown at the same time. Some unimproved mutants, genetically conditioned for infertility, displayed abnormal flowers in the greenhouse at Beltsville during the winter and spring months and normal flowers under near optimal growth environments. The inherent infertility is intensified by low light–low temperature interactions. Enhanced-lysine lines developed in vitro must be appropriately adapted to the specific growing regions.

This germplasm is valuable for the development of enhanced-lysine cultivars and for basic studies on protein processing, sterility, and stress biochemistry. Tissue cultures of these mutants export greater quantities of stress-related proteins, including β-1,3-glucanases, and should be particularly useful for the study of protein processing (4) and the isolation of genes associated with enhanced lysine and/or stress responses. Additionally, this germplasm has value for basic studies on seed chalkiness and fertility and the evaluation of β-glucanases in disease responses.

Characteristics of the five germplasm lines (Table 1), all of which have some heritage from Calrose 76, are as follows:

1. 2K41 represents germplasm (PI 564784) derived from two backcrosses of a mutant female with Calrose 76, selfed to the F_5 generation. Acid hydrolyzates of endosperm protein exhibit 3.9% lysine in seed proteins. Genetic studies indicate that plants carry the *sdl* dwarfing gene from Calrose 76. They flower in 100 d after seeding, later than Calrose 76, and have seed weight of 18.9 mg seed^{-1}. Kernels have soft opaque endosperm.
2. 2K539 represents germplasm (PI 564785) from a cross of an in vitro–derived mutant to pollen of M-101 and selfed to the F_6 generation. Endosperm exhibits 3.8% lysine in protein hydrolyzates, and the sum of all amino acids in the hydrolyzates are typically 10% greater per unit weight than Calrose 76. Plants are semidwarf and flower in 115 d after seeding. Fertility is 65% of normal. Seed weight is near normal at 19.2 mg seed^{-1}, and endosperm is chalky.
3. The 2K(C193) composite represents germplasm (PI 564786) from a cross of an in vitro–derived mutant to pollen of M-101, selfed to the F_4 generation. It is a composite of four lines with a wider range of characteristics and less homogeneity than the other four lines described here.
4. 2K497 represents germplasm (PI 564787) from a cross of an in vitro–derived mutant to pollen of M-101, selfed to the F_7 generation. Endosperm exhibits 3.8% lysine in protein hydrolyzates, and the grain has 9.2% protein based on single