

## REGISTRATIONS OF GERMPLASM

*Colletotrichum lindemuthianum* (Sacc. & Magnus) Lams.-Scrib.] resistant common bean (*Phaseolus vulgaris* L.) germplasms A 339 (Reg. no. GP-229, PI 632408), MAR 1 (Reg. no. GP-230, PI 632409), MAR 2 (Reg. no. GP-231, PI 632410), and MAR 3 (Reg. no. GP-232, PI 632411) were developed at the Centro Internacional de Agricultura Tropical (CIAT), Cali, Colombia. All four germplasms have *I* gene resistance to bean common mosaic virus (BCMV). In addition, they are resistant to races 38 and 53 of *Uromyces appendiculatus* (Pers.:Pers.) Unger, causing rust, and possess a moderate level of tolerance to race 2 of *Pseudomonas syringae* pv. *phaseolicola* (Burkh.), causing halo blight, and low soil fertility.

Angular leaf spot and anthracnose are seed-transmitted diseases, and major production constraints of common bean worldwide (Schwartz et al., 1982; Pastor-Corrales et al., 1995, 1998). Moreover, the pathogens are highly variable and only a handful of more than 20 000 common bean germplasm accessions screened were found to have resistance to both Andean and Middle American isolates (Schwartz et al., 1982; Pastor-Corrales et al., 1995, 1998).

A 339 was derived from a single-cross interracial population: MX 203 = 'Ojo de Lievre' (synonym G 2910 and PI 325668)/'Brasil 2' (synonym G 3807 and W6 18695). Ojo de Lievre is a medium-seeded (25 to 40 g per 100 seed) landrace from the semiarid highlands of Mexico, belonging to the common bean race Durango (Singh et al., 1991). Ojo de Lievre has an indeterminate, prostrate Type III growth habit (Singh, 1982) with a cream-striped seed coat, susceptibility to BCMV, and resistance to some races of ALS and anthracnose. Brasil 2 has a determinate Type I growth habit with small (<25 g per 100 seed) cream seed and a dark yellow hilum ring. Brasil 2 has the *I* gene resistance to BCMV, intermediate resistance to ALS, and a high level of resistance to anthracnose. The F<sub>5</sub> of population MX 203 was grown at CIAT-Popayán, which has a mean growing temperature of 18°C at 1750 m elevation, and 2000 mm annual rainfall. Soil type was a fine loamy, mixed, isothermic, Typic (Andic) Dystrandept (Inceptisol), with a pH of 4.3. All other generations were evaluated at CIAT-Palmira, which has a mean growing temperature of 24°C at 1000 m elevation, and ~1000 mm annual rainfall. Soil type was a fine silty, mixed, isohypothermic Aquic Hapludoll with a pH of 7.5. Selected plants in the F<sub>2</sub> and F<sub>3</sub> were harvested in bulk, followed by single plant selections in F<sub>4</sub>, F<sub>5</sub>, and F<sub>6</sub>. Thirty-one plants were bulked together in F<sub>7</sub> to obtain seed for A 339. A 339 has small (21 g 100 seed<sup>-1</sup>) cream seed, white flowers, and a Type III growth habit. In Colombia, A 339 flowered in 41 d and matured in 82 d.

MAR 1 was developed from a multiple-parent interracial population: BZ 5845 = BAT 85//A 83/XAN 112//'Catu' (W6 9626)//A 442/'Higuerillo' (PI 197683). BAT 85 was selected from a double-cross population: G 3834/'ICA Bunsii'//G 4792/Cornell 49-242 (PI 326418). BAT 85 has a Type III growth habit, small cream seed, *I* gene resistance to BCMV, and drought resistance. A 83 was developed from a three-way population: 'Carioca' (synonym G 4017 and PI 583642)//A 30/G 4000. A 83 has small cream-striped seeds, *I* gene resistance to BCMV, and a Type III growth habit. XAN 112, with small black seed and a Type II growth habit, was developed from a single-cross population: XAN 18/Sel. 26. Catu has small cream seed, resistance to anthracnose (*Co-2* synonym *Are* gene) and BCMV (*I* gene), and Type III growth habit. Dr. A. S. Pompeu at the Instituto Agronomico de Campinas, Sao

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### Registration of A 339, MAR 1, MAR 2, and MAR 3 Angular-Leaf-Spot- and Anthracnose-Resistant Common Bean Germplasm

Broad-based angular leaf spot [ALS, caused by *Phaeoisariopsis griseola* (Sacc.) Ferraris] and anthracnose [caused by

Paulo, Brazil, developed Catu. A 442 was developed from a single-cross interracial population: Carioca/Guanajuato 31' (synonym G 2618 and PI 608383). A 442 has medium cream-striped seed, *I* gene resistance to BCMV, resistance to anthracnose, and a Type III growth habit. Higuerrillo (synonym G 811) is a landrace from the highlands of Mexico from the common bean race Durango. Higuerrillo has medium-sized pinto-colored seeds, Type III growth habit, and resistance to ALS and anthracnose, but lacks resistance to BCMV. All parental genotypes were developed at CIAT except Catu and Higuerrillo. Population BZ 5845 was selected at CIAT-Quilichao, which has a 24°C mean growing temperature, 990-m elevation, and 1750-mm rainfall. Soil type was a very fine kaolinitic, isohypothermic, plinthic Kandiodox, with pH of 4.5. MAR 1 originated from a single plant selection in the F<sub>2</sub>, followed by bulk selection in F<sub>3</sub> and F<sub>4</sub>. MAR 1 has medium-sized (28 g 100 seed<sup>-1</sup>) cream-speckled seed, purple flowers, and a Type III growth habit. MAR 1 flowered in 42 d and matured in 80 d in Colombia.

MAR 2 was developed at CIAT-Popayán. MAR 2 was derived from a single-cross population: AR 3782 = A 252/Ecuador 299 (synonym G 5653). A 252, in turn, was selected from an interracial single cross population: Carioca/Guanajuato 31. A 252 has a Type III growth habit, small cream-striped seed, and resistance to anthracnose, BCMV (*I* gene), and some species of root-knot nematode (*Meloidogyne* spp.). Ecuador 299 has a Type IV growth habit, medium-sized light purple seed, and resistance to ALS, anthracnose, and rust, but lacks resistance to BCMV. The population AR 3782 was mass-selected in the F<sub>2</sub>, F<sub>3</sub>, and F<sub>4</sub>, followed by a single plant selection in F<sub>5</sub>. The entire F<sub>6</sub> plant-to-progeny row, without counting number of plants, was bulked to form the initial seed stock for MAR 2. MAR 2 has cream-striped seed, white flowers, and a Type III growth habit. MAR 2 is insensitive to long photoperiod, but, like MAR 1, flowered in 42 d and matured in 80 d in Colombia. The ALS resistance in MAR 2 to race 63.39 of *P. griseola* is controlled by a single dominant gene that is linked in coupling phase with random amplified polymorphic DNA marker OPE-04 at 5.8 cM (Ferreira et al., 2000).

MAR 3 was developed at CIAT-Popayán and selected from a single-cross population: MX 5042 = A 321/Higuerrillo. High-yielding low-soil-fertility-tolerant A 321 was developed from a three-way population: BAT 562//G 7474/Guanajuato 31. A 321 is highly resistant to anthracnose, has *I* gene resistance to BCMV, small cream seed, and a Type III growth habit. Thus, both MAR 1 and MAR 3 have Higuerrillo in their pedigree, and Guanajuato 31 is present in the pedigree of MAR 2 and MAR 3. Population MX 5042 was mass-selected in F<sub>2</sub> and F<sub>3</sub>, followed by single plant selection in F<sub>4</sub>. The F<sub>5</sub> plant-to-progeny row was bulked and seed increased in the subsequent generation to obtain the seed stock for MAR 3. MAR 3 has a Type III growth habit, small pinto-colored seed, and white flowers. MAR 3 is sensitive to long photoperiods (receiving a score of 8 on a 1 to 9 scale, where 1 = insensitive or day-neutral, and 9 = highly sensitive).

All nurseries at CIAT-Popayán were inoculated two to three times during the growing season with a mixture of isolates collected locally in the previous cropping seasons of the pathogens causing ALS and anthracnose. Similarly, mixtures of locally collected isolates in the previous cropping seasons of the ALS pathogen were used to inoculate nurseries at CIAT-Quilichao. Subsequently, the resistance reactions of four genotypes for ALS and anthracnose were verified in the greenhouse. They were also challenged by the NL-3 strain of the bean common mosaic necrosis virus (BCMV) in the greenhouse at CIAT-Palmira. Soils at CIAT-Popayán and CIAT-Quilichao have high levels of exchangeable Al and Mn,

thereby causing toxicity, and they also are deficient in N, P, B, Ca, and Mg (Singh et al., 2003). Because disease nurseries often were grown in residual soil fertility, these field environments also improved overall plant performance and tolerance to low soil fertility of the four ALS- and anthracnose-resistant germplasms.

Seed of A 339, MAR 1, MAR 2, and MAR 3 for research purposes is available from the corresponding author or directly from CIAT, A.A. 6713, Cali, Colombia.

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## Registration of Indeterminate Tall Upright Small Black-Seeded Common Bean Germplasm A 55

Small-seeded (<25 g per 100 seed) black common bean (*Phaseolus vulgaris* L.) germplasm A 55 (Reg. no. GP-233, PI 632407) was developed at the Centro Internacional de Agricultura Tropical (CIAT), Cali, Colombia. A 55 was derived from population TC 590 = TTS/77B-ICA 10303. Tallo Tipo Soya (TTS) was selected at CIAT-Palmira [1000 m elevation with a mean growing temperature of 24°C; fine silty, mixed, isohypothermic Aquic Hapludolls soil with pH 7.5; and ≈1000 mm annual rainfall] in the late 1970s from a multiple-parent common bean population of unknown pedigree. Tallo Tipo Soya had a Type II growth habit with a very strong main stem and less than two partially developed branches. ICA 10303, developed at the Instituto Colombiano Agropecuario (ICA), Palmira, Colombia, also had a Type II growth habit with small black seeds. The F<sub>2</sub> population was space-planted at CIAT-Palmira. Single-plant selections were made in the F<sub>2</sub>, followed by evaluation in plant-to-progeny rows in the