

# REGISTRATION OF GERMPLASM

## Registration of *Evenia Aeschynomene* IRFL 6945 Germplasm

IRFL 6945 *evenia aeschynomene* (*Aeschynomene evenia* C. Wright) (2) germplasm (Reg. no. GP-176, PI 572567) is a selection made in 1991 from invading plants in a Callide rhodesgrass (*Chloris gayana* Kunth) plot. This selection arose from 10 accessions first introduced in the late 1970s by the Indian River Research and Education Center, Fort Pierce, FL. This is a new tropical forage species not previously used for grazing.

IRFL 6945 is an erect, branching (from the soil level crown) tropical legume that can reach a height of about 2 m. Bipinnate leaves to 8 cm long have 19 to 28 leaflets, each about 5 mm long and 1 to 2 mm wide. Flowers are 5 to 6 mm long and have a pinkish-red appearance prior to opening, because of reddish striations occurring on the petals. When open, flower color is mostly mauve, with a pinkish center (4). One to two flowers are produced from each peduncle, from which 1 to 3 fruits are produced. Fruit color changes from green to brown upon maturity, and pods generally are comprised of 5 to 8 segments that sequentially dehisce from the terminal segment. Pod length ranges from 5 to 7.5 cm, with a width of about 3 mm. A slightly curved stipe, 1 to 2 mm long, extends from the flower end of the pod. Preliminary evaluation results indicated that this new potential tropical forage species (2) has several positive attributes compared with common *A. americana*, which has been used commercially in Florida for more than 20 yr. IRFL 6945 is more tolerant of waterlogging and is more persistent in southern Florida than *A. americana* (3). In southern Florida, the flowering of IRFL 6945 is indeterminate, (barring frost, it flowers year round), while common *aeschynomene* has a concentrated seed set in the fall, after which plants senesce and die. IRFL 6945 commercial seed production may reach about 300 kg ha<sup>-1</sup>. Hardseededness of IRFL 6945 is about 50%.

IRFL 6945 crude protein concentration in the top 30 cm, second 30 cm, third 30 cm, and stem base sections from widely spaced plants was 235, 150, 76, and 68 g kg<sup>-1</sup>, respectively. Closely spaced (and less branched) plants contained 296, 167, and 83 g kg<sup>-1</sup> for the top 30 cm, second 30 cm, and bottom >30 cm, respectively. In vitro organic matter digestibility for the respective segments of widely spaced plants was 665, 541, 321, and 277 g kg<sup>-1</sup>; for closely spaced plants, it was 672, 486, and 285 g kg<sup>-1</sup>.

Results from grazing IRFL 6945 in association with bahiagrass (*Paspalum notatum* Flügge) indicate that cattle (*Bos taurus*) at first prefer common *aeschynomene* to *evenia aeschynomene* IRFL 6945, until they become accustomed. Initial grazing should begin when plants are about 30 to 50 cm high, to increase early utilization and branching. In spring, stems up to about 6 mm were readily grazed, while in the fall smaller-diameter stems from more mature plants were consumed. Although IRFL 6945 is a perennial in southern Florida, a sparse stand subjected to periodic grazing in Louisiana has persisted 3 yr through reseeding. Heavily grazed plants of IRFL 6945 continue to flower and maintain vegetative growth. The fork-tailed caterpillar [*Ceylonese ceratose* (Guenée)], which feeds primarily on flower buds, may seriously reduce seed yields (1).

Small quantities of seed can be obtained from the Indian River Research and Education Center (5). Commercial quantities can be obtained from the Haile-Dean Seed Co., P.O. Box 1458, Winter Garden, FL 32787.

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## Registration of Sugarbeet Germplasms FC721 and FC721CMS Resistant to *Rhizoctonia* Root Rot and Moderately Resistant to the Beet Curly Top Virus

Sugarbeet (*Beta vulgaris* L.) germplasms FC721 (Reg. no. GP-185, PI 594910) and FC721CMS (Reg. no. GP-186, PI 594911) were developed by the USDA-ARS in cooperation with the Beet Sugar Development Foundation. They were released in 1996 from seed productions 931005HO and 931005HO1. These germplasms were released as sources of resistance to root-rotting strains of *Rhizoctonia solani* Kühn and incorporate moderate tolerance to the curly top virus and leaf spot (caused by *Cercospora beticola* Sacc.).

FC721 is a diploid, monogerm, O-type, self-fertile (*S*'), sugarbeet germplasm resistant to root and crown rot (caused by *R. solani* AG-2-2). It is relatively homogenous, easy bolting, and moderately tolerant to the beet curly top virus (BCTV) and *Cercospora* leaf spot (caused by *C. beticola* Sacc.). FC721 segregates for hypocotyl color (39% *rr*) and genetic male sterility (*aa*). It is the O-type (maintainer line) of its CMS equivalent, FC721CMS, which is the BC<sub>10</sub> with C718CMS (1) as the nonrecurrent parent.

One parental component of FC721 was a population developed from selected S<sub>1</sub> plants crossed with FC701 (2). The S<sub>1</sub> progeny were from populations that had been developed (in the early 1950s), selected, recombined, and reselected from a number of curly top and leaf spot resistant sources that included SLC122-0,

US 22/3 (3), US 22/4 (4), US 201 (5), SL 202, and US 35/2. The parent derived from these  $S_1$  selections  $\times$  FC701 segregated for genetic male sterility. Twenty-three male-sterile plants were pollinated by 13 fertile plants from C718 (1) to produce the  $F_1$  from which FC721 was selected. C718 from the USDA-ARS sugarbeet breeding program in Salinas, CA, is bolting resistant, moderately resistant to curly top, and has good combining ability for root and sucrose yield (1). The female parent combined sources of resistance to rhizoctonia root rot, cercospora leaf spot, and curly top virus.

$F_2$  plants were selfed in the greenhouse and O-type indexed. Twenty-five O-type,  $S_1$  plants were bulk increased in the greenhouse. The resulting population underwent five cycles of mass selection for resistance to rhizoctonia root rot concurrent with three cycles of mass selection for monogerm seedballs. The smallest population size during this selection process was nine plants.

In a 1994 replicated field evaluation for resistance to *R. solani* at Fort Collins, CO (6), FC721 and FC721CMS were not significantly different from each other or from the resistant check, but were significantly more resistant than the susceptible check. FC721 and FC721CMS had mean disease indices (DIs) of 1.8 and 2.3, compared with 1.8 and 4.9 for the resistant (FC703) and susceptible (FC901/C817//413) checks, respectively (DI of 0 = no root rot and 7 = all plants dead). Percentages of resistant plants (those rated 0 or 1) were 36, 36, 60, and 5 for FC721, FC721CMS, and the resistant and susceptible checks. The 1994 epiphytotic was severe and an excellent test of resistance to rhizoctonia root rot. In the more moderate 1995 epiphytotic, DIs of 1.7, 1.7, 1.8, and 3.4 for FC721, FC721CMS, resistant and susceptible checks were obtained. Percentages of healthy plants (those rated 0 or 1) were 45, 43, 58 and 7 for FC721, FC721CMS, resistant check, and susceptible check, respectively.

FC721 and FC721CMS were tested in 1994 and 1995 in the Beet Sugar Development Foundation's curly top nursery in Kimberly, ID. Under the severe epiphytotic of 1994, FC721 and FC721CMS performed intermediately—significantly poorer than the resistant control (Beta G6040), but significantly better than the susceptible control (FC718). FC721 and FC721CMS had mean DIs of 7.2 and 6.8, compared with 5.2 and 8.3 for the resistant and susceptible checks, respectively [Mumford's classification: 0 (= healthy) to 9 (= plant dead)]. In the more moderate 1995 epiphytotic, FC721 was not significantly different from the resistant check and FC721CMS was intermediate. FC721 and FC721CMS had mean DIs of 4.3 and 4.7, compared with 3.8 and 6.3 for the resistant and susceptible checks (L609), respectively.

FC721 and FC721CMS also show some resistance to cercospora leaf spot when tested in an artificial epiphytotic (7). When tested in the mild epiphytotic of 1994, they were not significantly better than the susceptible control (SP351069-0) or significantly different from the resistant control (FC504CMS/FC502-2//SP6322-0). In 1995, which was more severe than 1994, FC721 and FC721-CMS were intermediate in resistance (significantly different from both resistant and susceptible controls) with mean DIs of 4.5 and 4.7, compared with 3.5 and 6.2 for the resistant and susceptible checks (L609), respectively.

General combining ability of FC721 has not been tested. FC721 is proposed for use as an O-type population, with multiple disease resistance from which to select O-type monogerm parents for use in commercial three-way resistant hybrids.

Seed of FC721 and its CMS equivalent is maintained by the USDA-ARS and will be provided in quantities sufficient for reproduction upon written request to the corresponding author. We request that an appropriate recognition be made of the source when this germplasm contributes to the development of a new cultivar.

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