Registration of Annual O-Type and CMS Sugarbeet Germplasm Lines FC404 and FC404CMS

Sugarbeet (*Beta vulgaris* L.) germplasm lines FC404 (Reg. no. GP-164, PI 584987) and FC404CMS (Reg. no. GP-165, PI 584988) were developed by the USDA-ARS, Fort Collins, CO, in cooperation with the Beet Sugar Development Foundation, Denver, CO, and released in 1991. These germplasms were released to provide a monogerm annual O-type maintainer and cytoplasmic–genetic male sterile (CMS) equivalent pair. They may be useful to expedite generation advancement of specific hybridizations, in genetic studies, for other research purposes, and for O-type testing.

FC404 is the O-type maintainer for FC404CMS. It is a monogerm (*mm*) easy-bolting annual (*B*−), with green hypocotyledons (*rr*) and self-fertile (S^f = 0.97). FC404 was developed from the cross SLC 03(rr) × FC606(R−) (1), followed by four cycles of mass selection for monogerm annual plants. SLC 03 is a multigerm (*MM*) easy-bolting annual (*BB*), with green hypocotyledons (*rr*); it is self-fertile (S^fS^f) and highly inbred (S_{10}). FC404 bolts and flowers as readily as its annual parent (SLC 03) in the field and in the greenhouse at Fort Collins. Some plants within FC404 are probably heterozygous at the *B* locus. After four cycles of selection, the recessive allele, *b*, would be expected to have a frequency of about 0.06 within the line. When planted on 23 May in the field at Fort Collins, 82% of FC404 and 95% of FC404CMS bolted. An increase (= reselection for annualism) of FC404 and its CMS planted in the greenhouse on 25 July gave 100% bolting without cold induction. To induce flowering under short-day conditions, supplemental lighting is required. Usually, the small number of biennial plants should present no problem for researchers, because the biennial plants will remain vegetative and can be discarded.

Both parents of FC404 are O-type for the Owen cytoplasmic factor of CMS, but FC404 has not been specifically O-type selected. However, the CMS equivalent, FC404CMS, has shown no partial restoration. FC404 has not been assessed for disease reactions, but the original pollinator (FC606) was moderately resistant to cercospora leaf spot (caused by *Cercospora beticola* Sacc.) and curly top virus. The original population of FC404 consisted of F_1 plants, identified by the red hypocotyledon marker, produced from 41 plants of SLC 03 pollinated by 48 plants of FC606 (1). FC404 was released in 1991 as seed production 891048HO.

FC404CMS is the CMS BC_5 equivalent of FC404. It was developed from SLC 03CMS × FC606 (1), followed by five generations of backcrosses between selected monogerm annual CMS segregants and monogerm annual segregants from selections within SLC 03 × FC606 (1). FC404CMS has the common Owen cytoplasmic factor for CMS from SLC 03CMS. FC404CMS was released in 1991 as seed production 891048HO1. The released seed lots were produced from 17 pair crosses.

Breeder seed of FC404 and FC404CMS 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 appropriate recognition be made of the source when this germplasm contributes to a new cultivar.

L. W. PANELLA* AND R. J. HECKER (2)

References and Notes

1. Smith, G.A., and E.G. Ruppel. 1979. Registration of FC 606 and FC 606 CMS sugarbeet germplasm. Crop Sci. 19:300.
2. USDA-ARS, Crops Research Lab., 1701 Center Ave., Fort Collins, CO 80526-2081. A joint contribution of USDA-ARS and the Beet Sugar Development Foundation. Registration by CSSA. Accepted 30 Apr. 1995. *Corresponding author (Email: lpanella@lamar.colostate.edu).

Published in Crop Sci. 35:1721 (1995).

Registration of 19-L38-1472, a Powdery Mildew and Virus Resistant Red Clover Germplasm

19-L38-1472 red clover (*Trifolium pratense* L.) germplasm (Reg. no. GP-22, PI 586963) was released by the Kentucky Agriculture Experiment Station in 1995. It was the result of five cycles of phenotypic recurrent selection for resistance to peanut stunt (PSV) and bean yellow mosaic virus (BYMV) strains 204-1 and RC (1), and four cycles of selection for resistance to powdery mildew (caused by *Erysiphe polygoni* DC. emend. Salm.)

Selection was begun in 1983 with 35 red clover plants that had survived 3 yr of screening for BYMV and PSV resistance (1). Seeds from crosses of these plants were sown in a greenhouse and established on 1-m centers in a field in 1984 with 'Williams' soybean [*Glycine max* (L.) Merr.] sown in a 6.1-m width around the experiment. Soybean plants artificially inoculated with the RC strain of BYMV were transplanted between ranges to provide a source of inoculum. In 1985, 144 plants with no obvious virus symptoms were dug and transplanted to cages for seed increase. No plants were infected with PSV and BYMV as shown by ELISA (2). Phenotypic recurrent selection for virus resistance was continued for four more cycles and was completed in 1991. Selection intensity varied from 3.5 to 11.3% during the five cycles.

Beginning in 1986, plants were screened in the greenhouse as seedlings (prior to field planting) for resistance to powdery mildew. This was continued for three more cycles. Selection intensity was 13.8% in 1988; only a few plants were removed in succeeding cycles. The fourth cycle, with no selection constitutes 19-L38-1472.

Field plot testing in broadcast sown plots began in 1989 at two locations comparing 19-L38-1472 with the cultivars Kenland and Kenstar. Results over a 3-yr period indicated no superiority in yield and persistence compared with check cultivars (3,4). However, the germplasm possesses a unique combination of disease resistance genes that may be useful for further breeding efforts, particularly if PSV and BYMV become more of a factor in the future or at other locations. Up to 10 g of seeds of 19-L38-1472 may be obtained from the corresponding author.

N. L. TAYLOR* AND S. A. GHABRIAL (5)

References and Notes

1. Taylor, N.L., S.A. Ghabrial, S. Diachun, and P.L. Cornelius. 1986. Inheritance and backcross breeding of the hypersensitive reaction to bean yellow mosaic virus in red clover. Crop Sci. 26:68-74.
2. Clark, M.F., and A.N. Adams. 1977. Characteristics of the microplate method of enzyme-linked immunosorbent assay for the detection of plant viruses. J. Gen. Virol. 34:475–483.
3. Henning, J.C., L.M. Lauriault, N.L. Taylor. 1991. Kentucky red clover variety trials. Kentucky Agric. Exp. Stn. Prog. Rep. 339:1-3.
4. Lauriault, L.M., J.C. Henning, N.L. Taylor, G.D. Lacefield, and W.T. Edmondson. 1993. 1993 Kentucky red clover test report. Kentucky Agric. Exp. Stn. Prog. Rep. 358:1-10.
5. Dep. of Agronomy and Plant Pathology, Univ. of Kentucky, Lexington, KY 40546-0091. Journal Article no. 94-3-225 of the Kentucky Agric. Exp. Stn., Lexington. Published with approval of the director. Registration by CSSA. Accepted 31 May 1995. *Corresponding author (agr079@uky.edu).

Published in Crop Sci. 35:1721 (1995).