Registration of C842 and C842CMS Sugarbeet Germplasms with Resistance to Curly Top

Sugarbeet (*Beta vulgaris* L.) germplasm lines C842 (Reg. no. GP-248, PI 634217) and C842CMS (Reg. no. GP-249, PI 634218) were developed by the USDA-ARS in cooperation with the Beet Sugar Development Foundation (BSDF) and the California Beet Growers Association. They were released in 2004.

C842 is a monogerm (*mm*), self-fertile (*S*), genetic male sterile (*Aa*) facilitated, random-mated population. It segregates for *Rz1* resistance to rhizomania [caused by *Beet necrotic yellow vein virus* (BNYVV)] (Lewellen et al., 1987). It has about 90% red hypocotyls (*R*). It is moderately resistant to *Beet curly top virus* (BCTV) and should have genetic variability for high levels of resistance. In the 2004 BSDF curly top (CT) nursery in Idaho, C842 had a mean CT rating of 3.5 as compared to 4.0 for C869, 3.3 for C37 (Lewellen et al., 1985), and 3.0 for both C562 and C762–17. Susceptible check ‘Monohikari’ had an average rating of 5.9 on the 0 to 9 scale where 9 = dead. In tests at Salinas, C842 showed wide variability for reaction to bolting, sugarbeet Erwinia [caused by *E. carotovora* subsp. *betavasculorum* Thomson et al.], and powdery mildew [caused by *Erysiphe polygoni* DC. (syn. *E. betae* Weltzien)]. C842 has an intermediate genetic base relative to standard open-pollinated source lines. Selection of O-type, monogerm lines should be feasible. As a population, it has a moderately large, erect canopy and intermediate sugar level.

C842CMS is the cytoplasmic male sterile (CMS) counterpart of C842. It will be useful to quickly develop CMS equivalents of any lines extracted or developed from C842. It may be useful as a monogerm, CMS tester to evaluate multigerm lines for general combining ability.

C842 was developed to retain and recombine the resistance to CT of older monogerm, CT resistant inbreds and lines that had been used in commercial hybrids. Until 1995, monogerm populations with resistance to rhizomania had been under development, and two of these, C869 (PI 628754) (Lewellen, 2004) and C890 (PI 593700) (Lewellen, 1998), encompassed much of the germplasm from the monogerm breeding program at Salinas. In 1996, genetic male sterile plants from these developmental populations were crossed to a bulk of monogerm, O-type, CT resistant inbred lines including C562 (PI 590847) and C546 (PI 590649) (McFarlane & Skoyen, 1965), C718 (PI 590849) (Lewellen et al., 1978), C762–17 (PI 560130) (Lewellen, 1994), and C796–43 (PI 560131). Population 840 was produced by one cycle of recombination and selection for resistance to rhizomania. Genetic male sterile plants from population 840 and again C869 and C890 were crossed in approximately equal proportions to a second bulk of the CT resistant inbreds C562, C546, C718, C762–17, C796–43, C864–14 (PI 560132), and C867–1 to produce composite population 0841 in 2000. Population 0841 was selected for resistance to rhizomania, and monogerm plants were recombined through their genetic male sterile segregates to produce population 1842. Individual populations C842 and C842CMS have been used in further commercial hybrid development.

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References


