B3 are resistant to bean yellow mosaic potyvirus (BYMV); B4 is BYMV-susceptible and was developed as an experimental control (1). These germplasms were developed from intercrosses of berseem clover plant inventory accessions (PIs) selected for resistance (B1, B2, and B3) or susceptibility (B4) to BYMV, and should be useful for development of BYMV-resistant cultivars.

Seedlings of 96 PIs and the cultivars ‘Bigbee’ and ‘Multicut’ were grown in the greenhouse in winter 1993–1994 and mechanically inoculated with BYMV-Ky204-1 at the 2–4 trifoliate leaf stage. Individual plant reactions were scored from 1 to 4: 1 = no symptoms; 2 = mosaic with vein banding, vein clearing, and interveinal chlorosis; 3 = mosaic and leaf curl (leaflet margins rolled downward); and 4 = mosaic and necrosis of leaves and/or stems. Scores from 30 plants (10 plants each in three replicate plantings) were averaged to determine scores for each PI. Scores for Bigbee and Multicut were determined for six subsamples of 30 plants each for each cultivar; a total of 180 plants per cultivar. Symptomless plants from selected PIs were intercrossed using honey bees (Apis mellifera L.), to produce first generation (Cycle 1) seed, which was subsequently grown for a second cycle of selection.

The PIs were grouped according to symptom scores and three BYMV-resistant Cycle 1 populations were produced. Population B1 was produced from 86 plants of three PIs (468401, 517064, and 517060) with scores of 1.0; B2, from 264 plants of 11 PIs (220147, 291548, 291549, 517056, 468402, 517057, 445883, 420811, 163315, 445897, and 445882) and 26 plants of Multicut with mean scores of 1.1–1.2; and B3 from 1,340 plants of 78 PI lines, 18 plants of Bigbee and 100 plants of Multicut with mean scores of 1.3–2.6. A fourth population, B4, was developed as an experimental BYMV-susceptible control. B4 was derived from 30 symptomatic plants comprising 10 plants from each of three PIs (517055, 201954, and 241475) with mean scores of 2.3–2.7. All inoculated plants of these three PIs were symptomatic. Cycle 1 polycross seed of populations B1 and B2 were harvested and stored separately for each PI. Three to four grams of Cycle 1 polycross seed were produced per PI in the B1 and B2 populations. Cycle 1 polycross seed of populations B3 and B4 were respectively bulked.

Cycle 1 polycross seed from the four populations were grown in the greenhouse in winter 1994-95 for a second cycle of selection. Approximately 100 plants of each PI of B1, 30 plants of each PI of B2, 150 random plants of bulked population B3, and 100 random plants of bulked population B4 were inoculated with BYMV. After two inoculations, all B4 plants were symptomatic. Approximately 275 symptomless plants each, in the B1 and B2 populations, 120 symptomless plants in the B3 population, and 48 noninoculated plants of the B4 population were grown in isolation cages and respectively intercrossed using honey bees, to produce second generation (Cycle 2) B1, B2, B3, and B4 polycross germplasms. Tests of Cycle 2 polycross seed were conducted in spring 1996. Fifty seedlings of each germplasm were grown in the greenhouse and inoculated with BYMV; after a single inoculation, less than 10 % of BYMV-susceptible B4 control plants remained symptomless compared with 92, 80, and 78% for B1, B2, and B3, respectively.

Cycle 2 polycross seed were grown in the greenhouse in fall/winter 1997–1998. In spring 1998, without further selection, 64 plants each of B1, B2, and B3 Cycle 2 germplasms and 100 plants of Cycle 2 B4 were grown in separate greenhouse screen cages and polycrossed using honey bees to produce seed for distribution.

B1, B2, and B3 have upright growth with branches at the axis of the main stem. Plants have good regrowth following multiple clippings in the greenhouse, similar to Multicut. In the field, plantings of B1, B2, B3, and Multicut seeded 13 Sept. 1995 had similar dry matter forage yields of 1.3 to 1.5 times that of Bigbee in a single 1 December harvest, but did not survive a hard mid-winter freeze, while Bigbee in adjacent plots of the same planting survived and grew normally. These germplasms should be useful as sources of resistance to BYMV for possible cultivar selection or for crossing to adapted cultivars. B4 should be useful as a BYMV-susceptible control in selection and breeding programs. B4 has upright growth with axillary branching on the main stem. B4 flowers and sets seed 3 to 4 weeks earlier than the other germplasms and may be self-pollinated. In the above 1995 field test, B4 produced 1.9 times the dry matter forage yield of Bigbee, but did not survive the hard mid-winter freeze.

Small quantities of seed of the second (unselected) polycross generation of the Cycle 2 germplasms are available for distribution to qualified researchers upon written request to the corresponding author, while supplies last. Recipients of seed are asked to make appropriate recognition of the germplasm source if it is used in the development of a new cultivar, germplasm, parental line, or genetic stock.

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References and Notes

2. USDA-ARS, Crop Science Research Laboratory, Waste Management and Forage Research Unit, P.O. Box 5367, Mississippi State, MS 39762-5367. Joint contribution of USDA-ARS and the Mississippi Agric. and Forestry Exp. Sin. Registration by CSSA. Accepted 31 July 1999. *Corresponding author (mmclaug@ra.msstate.edu).

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Registration of BYMVRB Berseem Clover Germplasm

Bean yellow mosaic virus-resistant berseem (BYMVRB) clover (Trifolium alexandrinum L.) germplasm (Reg. no. GP-196, PI 606775), was released in 1998 by the USDA-ARS and the Mississippi Agricultural and Forestry Experiment Station. BYMVRB was developed from intercrosses of berseem clover plant inventory (PI) accessions selected for resistance to bean yellow mosaic potyvirus (BYMV) (4), and should be useful for development of BYMV-resistant cultivars.

Seedlings of 96 PI accessions and the cultivars ‘Multicut’ (1) and ‘Bigbee’ (2) were grown in the greenhouse in winter 1993–1994 and mechanically inoculated (3) with BYMV-Ky204-1 at the 2–4 trifoliate leaf stage. Individual plant reactions were scored from 1 to 4: 1 = no symptoms; 2 = mosaic with vein banding, vein clearing, and interveinal chlorosis; 3 = mosaic and leaf curl (leaflet margins rolled downward); and 4 = mosaic and necrosis of leaves and/or stems. Scores from 30 plants (10 plants each in three replicate plantings) were averaged to determine scores for each PI. Scores for Bigbee and Multicut were determined for six subsamples of 30 plants for each cultivar; a total of 180 plants per cultivar. Limited serological testing by double antibody sandwich enzyme-linked immunosorbent assay confirmed BYMV infections in plants with scores of 2, 3, and 4, and absence of BYMV in plants with scores of 1.

Nine PI lines identified as resistant to BYMV in 1993–1994 tests were selected for polycrossing during fall 1996. Plant inventory (passport) documents identified one line as ‘late flowering’ and eight lines as named cultivars. Plant inventory accession numbers, cultivar names, and BYMV scores, respec...