SUGAR BEET (*Beta vulgaris* ssp. *vulgaris*)
    Cercospora leaf spot; *Cercospora beticola*

I.A. Eujayl, E. Vincill, and C.A. Strausbaugh, USDA-ARS NWISRL, 3793 N. 3600 E., Kimberly, ID 83341; and L.E. Hanson, USDA-ARS, Sugarbeet and Bean Research Unit, East Lansing, MI 48824

Beta vulgaris lines from USDA-ARS Kimberly evaluated for resistance to _Cercospora beticola_, 2016.

Six sugar beet (*Beta vulgaris* L.) germplasm lines from the USDA-ARS Kimberly program and two check lines [EL50/2 (resistant) and F1042 (susceptible)] were screened for resistance to *Cercospora beticola*. The Cercospora leaf spot (CLS) evaluation was conducted at the Michigan State University Saginaw Valley Research and Extension Center (SVREC) near Frankenmuth, MI in a field that had been planted in wheat with clover underseeded in 2015. The germplasm was planted on 6 May and thinned by hand as necessary to 20,978 plants/ha. Single-row plots 4.5 m long with 51 cm between row spacing were planted with the treatments arranged in a randomized complete block design with four replications. Quadris 2.08SC (azoxystrobin) was applied at 0.0091 kg/100 m row in a 14 cm band in-furrow at planting to control Rhizoctonia damping-off. Weeds were controlled by a preplant application of ethofumesate 9 May, four times with mixtures of phenmedipham, desmedipham, triflusulfuron methyl, and clopyralid (18 and 23 May, 10 Jun, and 21 Jun), and once with S-metolachlor (29 Jun). The herbicide spray treatments had to also be supplemented with hand weeding. The nursery was spray inoculated on 5 Jul with a liquid spore suspension (1 x 10^3 spores/ml) of *C. beticola*. The inoculum was produced from a mixture of leaves collected from the 2015 CLS nursery at SVREC and from naturally infected sugar beets grown at SVREC and on the Michigan State University campus farms in East Lansing, MI. The plots were rated for foliar symptom development on 6 Sep using a scale of 0 to 10 (0 = no symptoms and 10 = all leaves dead; J. Am. Soc. Sugar Technol. 16:284). Data were rank transformed prior to analysis in SAS (Ver. 9.4) with mixed linear models (Proc MIXED), but the non-transformed means have been presented in the table. Mean separation was based on a PDIFF comparison with a probability cutoff of 0.05 (Phytopathology 94:33-43).

Cercospora leaf spot development was uniform and moderate and other disease and pest problems were not evident in the plot area. The checks performed as expected for the visual rating. Statistically, five of the entries contain at least some resistance since their visual ratings were better than the susceptible check. However, entry 3 was better than the resistant check and entries 4, 5, and 6 were equal to the resistant check. These data confirm what had been determined the previous year, so these lines will be incorporated into the USDA-ARS germplasm improvement program as a source of resistance to CLS.

Entry[z]	Accession[y]	Description	Cercospora leaf spot rating[x]
3	KEMS8	PI 663873 EMS treated	1.7 d
4	KEMS6	PI 663873 EMS treated	2.7 c
5	KEMS6600	KEMS6 gamma irradiated at 600GY	3.0 c
R chk	EL50/2	CLS resistant check; PI664912	3.2 c
6	KEMS12	PI 622570	3.7 c
2	K1919	PI 663873 mass selection	4.8 b
1	KDH49	Double haploid derived from C762-17	9.0 a
S chk	F1042	CLS sensitive check, PI 674103	9.0 a
$P > F$[w]			<0.0001

[z] Two entries were check lines: S chk (susceptible check line F1042) and R chk (Resistant check line EL50/2).

[y] All lines were *Beta vulgaris* subspecies *vulgaris* (cultivated beet).

[x] Cercospora leaf spot (CLS) ratings = the CLS disease index was on a scale of 0 to 10 (0 = no symptoms, 1 = a few scattered spots, 2 = spots coalescing or in large numbers on lower leaves only, 3 = some dieback on lower leaves, but leaves not entirely dead, 4-8 were increasing amounts of dead and diseased tissue, 9 = mostly dead with few remaining living leaves with large dead patches, and 10 = all leaves dead; J. Am. Soc. Sugar Technol. 16:284).

[w] $P > F$ was the probability associated with the F value when using rank transformed data. Within a column, means followed by the same letter did not differ significantly based on PDIFF with a probability cutoff of 0.05. The non-transformed mean values are presented.