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Field Symptom-Response of Sorghum Hybrids Infected by Maize Dwarf Mosaic Virus, Sugarcane Mosaic Virus Strain MDMV-B, and Johnsongrass Mosaic Virus (1998)

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FIELD SYMPTOM-RESPONSE OF SORGHUM HYBRIDS INFECTED BY MAIZE DWARF MOSAIC VIRUS, SUGARCANE MOSAIC VIRUS STRAIN MDMV-B, AND JOHNSONGRASS MOSAIC VIRUS

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The complex of viruses causing the disease of sorghum (*Sorghum bicolor* (L.) Moench) called maize dwarf mosaic includes maize dwarf mosaic virus (MDMV), sugarcane mosaic virus strain MDMV-B (SCMV-MDMV-B), johnsongrass mosaic virus (JGMV), and sorghum mosaic virus. At present, MDMV, SCMV-MDMV-B, and JGMV have been isolated from sorghum in Kansas. Infection of sorghum by each virus initially results in a mosaic leaf symptom. However, depending upon genotype, when the temperature drops below approximately 21°C (69°F), the mosaic symptoms of the leaf may become necrotic and kill a portion or all of the leaf (red-leaf reaction). Hybrids expressing the red-leaf symptom show greater reduction in yield. Therefore, inoculation of sorghum hybrids with these viruses will identify those having only the mosaic reaction and, thus, less yield loss and also may indicate which viruses are causing the symptoms.

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Procedures

Studies were conducted at the Kansas State University Agricultural Research Center-Hays to determine symptom response of sorghum hybrids infected by MDMV, SCMV-MDMV-B, and JGMV under 2 years of field testing. Sorghum seed was planted in 6.1 m rows. When at the two-leaf to three-leaf stage, plants in half of each row were inoculated, and plants in the remaining half of the row served as healthy controls. Plants were inoculated with a Devilbiss EGA-502 spray gun attached to a 3.5 L (1 gal) inoculum reservoir. Compressor line pressure was maintained at 7.0 kq/sq cm (100 lbs/sq in). Symptom notes were recorded at biweekly intervals during the growing season beginning 2 weeks after inoculation. Planting was delayed until late June to assure cool temperatures for induction of red-leaf necrosis.

Results

Field symptoms of hybrids are shown in Table 1. Symptoms of infection are given as M = mosaic reactions with no necrosis; NSp = necrotic spots (least severe necrotic reaction); NSt = necrotic streaks often coalescing to form large, irregularly shaped, necrotic areas on the leaf; RL = entire leaf necrotic (most severe necrotic reaction); and NT = not tested. Data indicate that sorghum hybrids having the M reaction suffer less yield loss than plants developing necrosis (RL types).

Table 1. Disease reaction of field-grown sorghum following mechanical inoculation with maize dwarf mosaic virus (MDMV), sugarcane mosaic virus strain MDMV-B (SCMV-MDMV-B), and johnsongrass mosaic virus (JGMV).

Brand	Hybrid	MDMV	SCMV-MDMV-B	JGMV
Agripro	AP 2440	M	M	M
Agripro	AP 2660	NSt	RL	M
Agripro	AP 9135	NSt	NT	M
Agripro	AP 9210	NSt	NT	M
Agripro	AP 9670	RL	NSt	M
Agripro	AP 9690	NSt	NSt	M
Agripro	AP 9850	M	NT	M
Asgrow	A 425	M	M	NSt
Asgrow	A 504	NSt	RL	M
Asgrow	A 531	NSt	RL	M
Asgrow	A 571	M	M	M
Asgrow	A 570	M	NSt	M
Asgrow	Seneca	M	M	M
Cargill	575	RL	NSt	M
Cargill	607E	NSt	NSt	M
Cargill	611Y	M	NT	NSt
Cargill	627	NSt	RL	M
Cargill	647	M	M	M
Cargill	730	NSt	NS	M
Cargill	737	NSt	M	M
Cargill	775Y	RL	NSt	M
Cargill	837	NSt	NSt	M
Casterline	SR315E	NSt	NSt	M
Casterline	SR317EW	NT	NT	M
Casterline	SR319E	NSt	NSt	M
Casterline	SR324E	NSt	NSt	M
Century II	GB5543-E	M	M	M
Century II	GB7042E	M	M	M
Century II	GB8041W	RL	M	NSt
Century II	GB9140-E	M	M	M
Ciba	1486	NSt	RL	NP
Ciba	1606	NSt	NS	M
Ciba	55492	NSt	NSt	M
Dekalb	DK-35	RL	NSt	M
Dekalb	DK-44	NSt	NSt	NSt
Dekalb	DK-47	M	M	M
Dekalb	DK-38Y	NSt	NSt	NSt
Dekalb	DK-39	NSt	NSt	NSt
Dekalb	DK-40Y	NSt	NSt	NSt
Dekalb	DK-NSt 1Y	NSt	NSt	NSt
Dekalb	DK-45	NSt	NSt	NSt
Dekalb	DK-48	NSt	NSt	M
Dekalb	DK-51	NSt	NSt	M
Dekalb	DK-54	M	M	M
Dekalb	DK-55	NSP	NT	M
Dekalb	DK-56	M	M	NSt
Dekalb	DK-58	NSt	NSt	NSt
Dekalb	M-61	NSt	RL	M
Delange	DA 117	M	M	M
Delange	DS 12C	RL	NSt	M
Delange	DS 11	NSt	RL	M

Table 1. (continued)

Brand	Hybrid	MDMV	SCMV- MDMV-B	JGMV
Delange	DS 51	NSt	NSt	M
Delange	DSA 115C	NSt	NT	M
Deltapine	1482	NSt	NSt	M
Deltapine	1490Y	NSt	NSt	M
Deltapine	1505Y	RL	NSt	M
Deltapine	1506	NSt	RL	M
Fontanelle	4425	NSt	RL	M
Fontanelle	5570	M	M	M
Fontanelle	5588	M	M	M
Fontanelle	EXP 6300	M	NSt	M
Golden Harvest	H-403	NSt	RL	M
Golden Harvest	H-509	M	M	M
Golden World	GW 1131	NSt	NSt	M
Golden World	GW 5946	M	M	M
Golden World	5872	NSP	NT	NT
Golden World	5960	NSt	NT	M
GRI	23977	NSt	NSt	M
GRI	47967	NSP	NT	M
GRI	54977	RL	RL	M
GRI	57977	NSt	RL	NSt
Hoegemeyer	6650	NSt	NSt	M
Hoegemeyer	671	NSt	NSt	M
Hoegemeyer	6710	NSt	NSt	M
Hoegemeyer	6874	M	NT	M
Hoegemeyer	6878	NSt	RL	M
Hoegemeyer	688	NSt	RL	M
ICI	5514Y	NSt	RL	M
ICI	5536	NSP	M	M
ICI	5631Y	RL	NSt	M
Kaystar	KS 502	M	M	M
Kaystar	KS 520C	M	M	NSt
Kaystar	KS 525	RL	NSt	M
Kaystar	KS 528	NSt	RL	M
Kaystar	KS 540Y	NSt	NSt	NSt
Keltgen	KG 636	M	M	M
Keltgen	KG 640Y	NSt	NSt	NSt
Keltgen	KG 675	M	M	M
Keltgen	KG 698cr	RL	NSt	M
Keltgen	KG 706	NSt	NT	M
MSG	G256	NSt	RL	M
MSG	G530	NSt	RL	M
MSG	G580	NSt	NSt	M
Mycogen	3838	NSt	NT	M
Mycogen	444E	M	NT	M
Mycogen	466W	RL	NT	M
Mycogen	Oro Amigo	M	NT	M
Mycogen	T-E Hardy	NSt	NT	M
Mycogen	T-E Rio	M	NT	M
Mycogen	T-E Y75	NSt	M	M
NC+	5B74E	M	M	M
NC+	6B50	NSt	NSt	M
NC+	6B67	NSt	NSt	M
NC+	6R55E	NSt	M	M
NC+	6Y831	NSt	RL	M
NC+	7R37E	NSt	NSt	M
NC+	7R83	NSt	NSt	M

Table 1. (continued)

Brand	Hybrid	MDMV	SCMV- MDMV-B	JGMV
NC+	8B15	NSt	NSt	M
NC+	363	RL	NSt	NSt
Northrup King	KS 310	NSt	NSt	M
Northrup King	KS 585	NSt	RL	M
Northrup King	KS 711Y	NSt	NS	M
Northrup King	KS 555Y	RL	NSt	NSt
Northrup King	KS 560Y	M	NSt	M
Northrup King	KS 710	RL	RL	M
Northrup King	KS 714Y	RL	NSt	NSt
Northrup King	KS 735	NSt	RL	M
Ohlde	134	NSt	NSt	M
Ohlde	136	NSt	RL	M
Ohlde	214	RL	NSt	M
Ohlde	215	RL	RL	M
Ohlde	222C	M	RL	M
Ohlde	240W	NSt	RL	M
Ohlde	246Y	NSt	RL	M
Ohlde	350	NSt	RL	M
Patriot	8530Y	RL	NSt	M
Patriot	8580	NSt	RL	M
Patriot	8608Y	NSt	NSt	NSt
Patriot	8638Y	M	M	M
Pioneer	8118	NSt	RL	NSt
Pioneer	8212Y	RL	NSt	M
Pioneer	8282	NSt	NSt	M
Pioneer	8310	NSt	NSt	M
Pioneer	8414	NSP	M	M
Pioneer	8500	RL	NSt	M
Pioneer	8505	M	NSt	M
Pioneer	8522Y	M	NSt	NSt
Pioneer	8699	M	M	M
Pioneer	8771	M	M	M
Triumph	TR 459	M	M	M
Triumph	TR 474	NSt	NSt	NSt
Triumph	TR 481	M	M	M
Triumph	TR 65-G	M	M	M
Triumph	TR 82-G	M	M	M
Wilson	515w	RL	NSt	NSt
Wilson	535Y	NSt	RL	M
Wilson	568E	M	M	M
Wilson	E9190W	M	M	M